Independent Market Research on Asset Pooling as a Service

Focus on Pallets, Containers & Material Handling

August 2025

FROST & SULLIVAN

DISCLAIMER

The market research process for this study has been undertaken through secondary or desktop research, as well as primary research, which involves discussing the status of the industry with leading participants and experts. The research methodology used is the Expert Opinion Consensus Methodology. Quantitative market information was sourced from interviews by way of primary research, and therefore, the information is subject to fluctuations due to possible changes in the business and industry climate. Frost & Sullivan's estimates and assumptions are based on varying levels of quantitative and qualitative analyses, including industry journals, company reports and information in the public domain.

Forecasts, estimates, predictions and other forward-looking statements contained in this report are inherently uncertain because of changes in factors underlying their assumptions, or events or combinations of events that cannot be reasonably foreseen. Actual results and future events could differ materially from such forecasts, estimates, predictions or such statements.

Frost & Sullivan has prepared this study in an independent and objective manner, and it has taken adequate care to ensure its accuracy and completeness. We believe that this study presents a true and fair view of the **Asset Pooling as a Service - Focus on Pallets, Containers & Material Handling** market in India within the limitations of, among others, secondary statistics and primary research, and it does not purport to be exhaustive. Our research has been conducted with an "overall industry" perspective, and it may not necessarily reflect the performance of individual companies in the industry. Frost & Sullivan shall not be liable for any loss suffered because of reliance on the information contained in this study. This study should also not be considered as a recommendation to buy or not to buy the shares of any company or companies as mentioned in it or otherwise.

TABLE OF CONTENTS

1 MACROECONOMIC ATTRACTIVENESS OF THE INDIAN MARKET

The global economy is gradually stabilizing, though geopolitical tensions continue to cloud the outlook. Inflation is showing signs of stabilization, with a clear downward trend prompting several central banks to begin easing monetary policy. The European Central Bank and Bank of Canada both cut rates in June 2025, marking a shift toward policy easing amid softening inflation. More countries are expected to follow as price pressures continue to moderate. Key trends shaping this landscape include AI-driven productivity gains, reconfiguration of global supply chains, and rising debt levels.

"India is the fastest growing economy in the world, with GDP accelerating at 9.5% between CY 2024–2029p, driven by a booming digital economy and a demographic dividend that is positioning it as the new engine of global growth."

1.1 KEY MACRO ECONOMIC INDICATORS

1.1.1 GDP And Growth

Advanced economies like the North America, European Union and Australia and New Zealand (ANZ) face moderated growth trajectories. However, emerging markets, particularly India, demonstrate resilience and long-term potential. India's GDP stands at USD 3.9 trillion as of FY2025, and is expected reach USD 6.1 trillion by FY 2030, achieving a robust 9.5% CAGR (FY25-FY30p), the highest among major economies. On the other hand, the GCC region is forecasted to grow at 4.1% (2024–29p), supported by continued economic diversification and energy market stability. Particularly in Saudi Arabia and the UAE, investments in renewable energy, tourism, and technology are helping reduce reliance on oil revenues, providing a more balanced growth path. North America, European Union and ANZ being matured markets, are also experiencing slow growth compared to the developing countries. North America maintains moderate growth, driven by resilient consumer demand and steady technological advancements, while the European Union struggles with weaker industrial output and tighter fiscal constraints. Figure 1.1 compares GDP growth trajectories (2019-2029p) for India, GCC, China, North America, and European Union.

Figure 1.1: GDP of India, GCC, China, North America (NA), European Union (EU) and Australia and New Zealand (ANZ), CY 2019-2029p

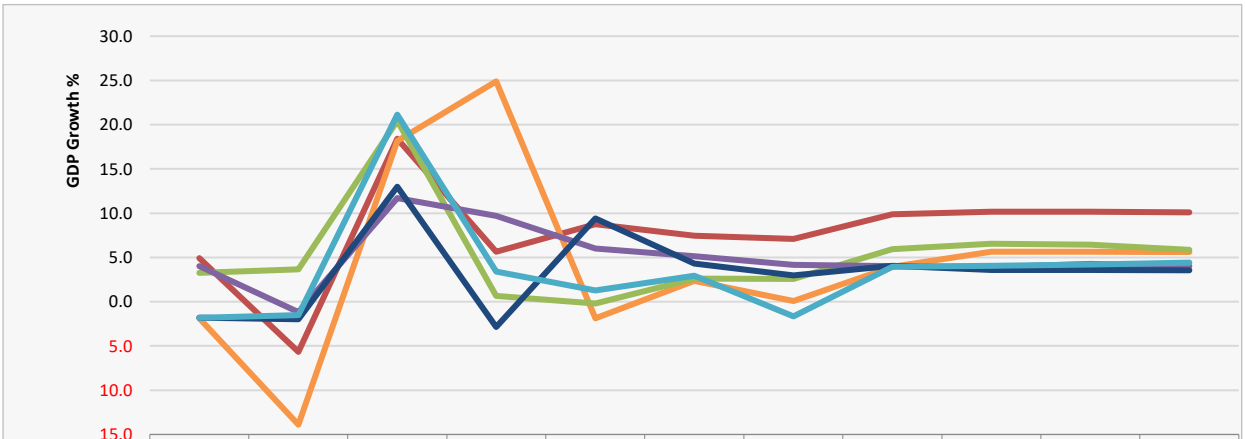
CY 2019	**(US $ Billion)**	**2,836**	1,702	14,572	23,283	15,810	1,597
CY 2024	**(US $ Billion)**	**3,909**	2,156	18,748	32,254	19,412	2,054
CY 2029p	**(US $ Billion)**	**6,148**	2,641	24,455	39,406	23,116	2,377
CY 2019-24	**CAGR (%)**	**6.6**	4.8	5.2	6.7	4.2	5.2
CY 2024-29p	**CAGR (%)**	**9.5**	4.1	5.5	4.1	3.5	3.0

Source: *World Economic Outlook Database, April 2025, IMF and Frost and Sullivan Analysis* ***Note:*** *Growth rates are based on current prices, India numbers are for Fiscal Year (April-March)*

India's strong economic momentum is driven by a young population, rapid urbanization, rising incomes, and key policy reforms. It is now the world's 5th largest economy in FY 2025, and the fastest growing among major nations. Growth is fuelled by strong domestic demand, expanding manufacturing and services, and government initiatives such as production-linked incentives (PLI), infrastructure development, and digital adoption, making India a high-potential

market for long-term retail growth. Figure 1.2 analyses economic growth projections across key global markets (2019-2029p) and Figure 1.3 tracks inflation rate trends across advanced economies, emerging markets, and India (2019-2029p)

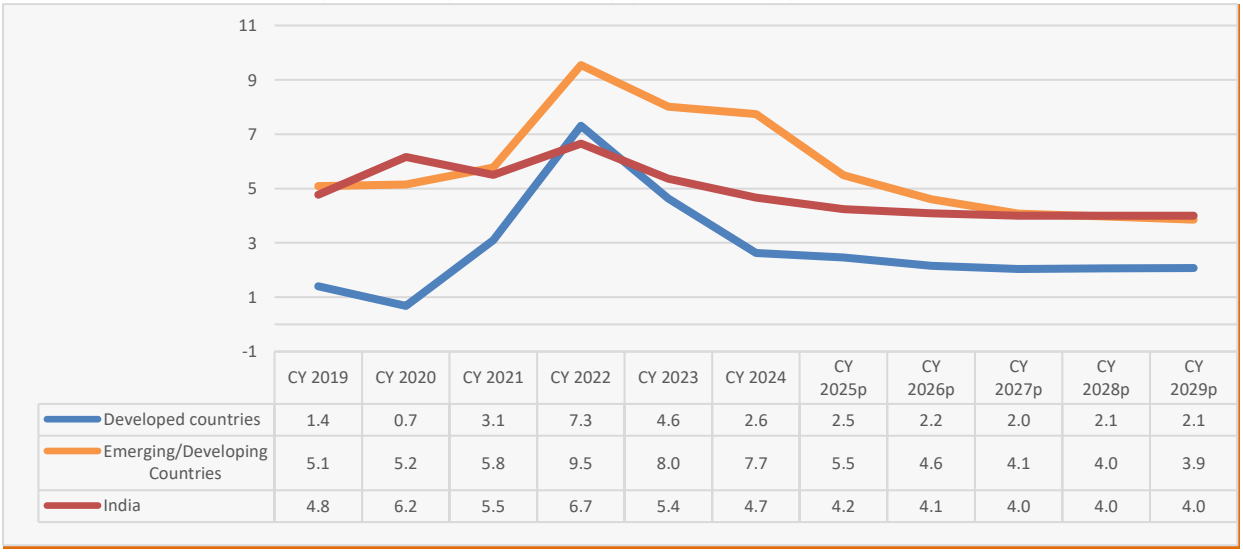
Figure 1.2: GDP Growth Forecasts, India, GCC, China, NA, European Union (EU) and ANZ, CY 2019-2029p



	CY 2019	CY 2020	CY 2021	CY 2022	CY 2023	CY 2024	CY 2025p	CY 2026p	CY 2027p	CY 2028p	CY 2029p
India	4.9	-5.7	18.4	5.6	8.7	7.4	7.1	9.9	10.2	10.2	10.1
GCC	-1.9	-13.9	18.2	24.9	-1.9	2.4	0.1	3.9	5.7	5.6	5.6
China	3.3	3.6	20.4	0.6	-0.2	2.6	2.6	5.9	6.5	6.4	5.9
NA	4.0	-1.2	11.7	9.7	6.0	5.1	4.2	4.0	3.9	4.3	4.0
EU	-1.8	-2.0	13.0	-2.9	9.4	4.3	3.0	4.0	3.6	3.6	3.6
ANZ	-1.8	-1.5	21.1	3.4	1.3	2.9	-1.7	4.0	4.0	4.2	4.4

Source: *IMF-April 2025 and Frost and Sullivan Analysis.* ***Note:*** *Based on current prices, India numbers are for Fiscal Year (FY 2020-30)*

Figure 1.3: Inflation rates in Advanced, Emerging/Developing countries and India, CY 2019-2029p



	CY 2019	CY 2020	CY 2021	CY 2022	CY 2023	CY 2024	CY 2025p	CY 2026p	CY 2027p	CY 2028p	CY 2029p
Developed countries	1.4	0.7	3.1	7.3	4.6	2.6	2.5	2.2	2.0	2.1	2.1
Emerging/Developing Countries	5.1	5.2	5.8	9.5	8.0	7.7	5.5	4.6	4.1	4.0	3.9
India	4.8	6.2	5.5	6.7	5.4	4.7	4.2	4.1	4.0	4.0	4.0

Source: *World Economic Outlook Database, April 2025, IMF and Frost and Sullivan* ***Note:*** *India numbers are for Fiscal Year (FY 2020-30)*

With inflation remaining elevated, currently at 2.6% in advanced economies and 7.7% in emerging markets in CY 2024, optimizing supply chains has become urgent amid changing commodity prices. While commodity prices have cooled down globally, they have increased in the US due to import tariffs. Developing nations like India with a 4.7% inflation rate in FY 2025, are actively upgrading logistics infrastructure to mitigate cost pressures. The 2022 inflation shock (9.5% in emerging markets vs 7.3% in advanced economies), driven by supply chain disruptions from the pandemic and geopolitical tensions, demonstrated why building resilient supply chains is critical for economic stability moving forward.

1.1.2 Per-Capita Income and Growth

The growth in per capita income in developed countries like the U.S. and Germany is expected to be low due to their advanced stage of economic development and already high per capita income, where the growth trend slows down and stabilizes. Most of the global growth in per capita income will stem from developing countries in South Asia, specifically from countries like India and China. The GCC is also expected to exhibit sustained per capita income growth rates between CY 2024-29p due to continuous government initiatives and investments under Vision 2030, which outlines its growth objectives to be achieved by 2030. Figure 1.4 compares per capita income trends across major economies including India between 2019-2029p.

"Developing economies, particularly in South Asia (India, China) will drive global per capita income growth, benefiting from favourable demographics, industrial expansion, and policy-driven investments, while advanced economies face slower growth due to their high-income maturity and saturated markets."

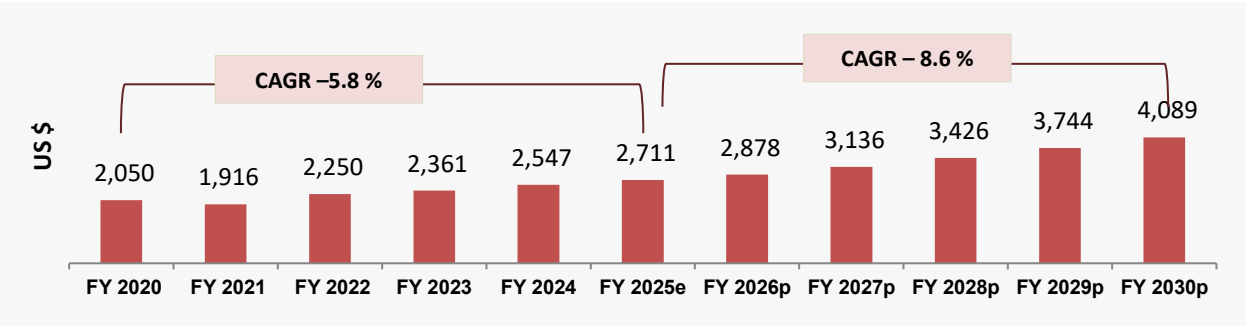
Figure 1.4: Per Capita Income of India, GCC, China, North America (NA), European Union (EU), ANZ and World Average, CY 2019-29p

		India	GCC	China	NA	European Union	ANZ	World Average
Per Capita Income in US $ (CY 2024)		2,711	35,424	13,313	84,601	43,140	63,300	13,930
Per Capita Income (CY 2029)		4,095	41,066	17,565	1,00,479	50,805	68,867	16,625
CAGR (%)	CY 2019-2024	5.8	1.2	5.2	5.4	4.5	3.9	2.5
	CY 2024-2029p	8.6	3.0	5.7	3.5	3.3	1.7	3.6

Source: *World Economic Outlook Database, April 2025, IMF and Frost and Sullivan Analysis.* ***Note:*** *Based on current prices, India numbers are for Fiscal Year (FY 2020-30)*

The government's progressive tax reforms, including the Union Budget 2025-26 provision making personal income up to INR 1.2 million tax-free, are putting more disposable income in the hands of middle-class households. This enhanced purchasing power, coupled with improved tax compliance and efficiency, is creating greater "cash in hand" for consumers. The resulting boost in disposable income is expected to accelerate domestic consumption, particularly for consumer staples and discretionary items. The projected CAGR of 8.6% per capita income growth for FY2025–30, compared to 5.8% during FY2020–25, reflects a strong recovery trajectory driven by several factors. The prior period was adversely impacted by the COVID-19 pandemic, which disrupted economic activity and constrained income growth, resulting in a lower base effect. Going forward, the economy is expected to benefit from government-led initiatives such as the Production Linked Incentive (PLI) schemes and the Make in India 2.0 strategy, expected to significantly boost manufacturing output and enhance export competitiveness, supporting broader economic advancement. In line with this trajectory, Figure 1.5 illustrates the steady growth of India's per capita income over FY 2020–2030.

Figure 1.5: Per Capita Income, India, FY 2020 – 2030p



Source: World Economic Outlook Database, April 2025, IMF and Frost & Sullivan

1.1.3 Household Income

Income based population groups in India can be broadly categorized into five groups: low income, lower middle income, middle income, upper middle income and upper income. The lower-middle-income group is the largest, followed by middle-income group and upper middle income. The increasing per capita income of the nation will increase the number of the upper middle class. By 2030 the government aims to decrease poverty rate by more than 10%, which will positively impact consumption growth. On the other hand, the lower middle-income class is expected to grow faster due to strong economic growth projections, rising employment opportunities in formal and informal sectors, increasing access to education and skill development, expanding social welfare schemes, and improved financial inclusion through digital banking and government-led initiatives like Jan Dhan Yojana and DBT (Direct Benefit Transfer). Fig 1.6 illustrates population split by income for India for CY 2019 -2029p.

Figure 1.6: Population Split by Income, India, CY 2019 – 2029p

Year		Low Income < ₹100,000 per annum	Lower Middle Income ₹100,000-200,000 per annum	Middle income ₹200,000-500,000 per annum	Upper middle ₹500,000-1,000,000 per annum	High income >₹1,000,000 per annum
CY 2019		14.00%	44.50%	30.50%	10.50%	0.50%
CY 2024		9.00%	47.50%	31.50%	11.50%	0.50%
CY 2029p		8.05%	47.85%	31.75%	11.75%	0.60%
CAGR %	**2019-24**	-7.1	2.8	2.1	3.3	1.4
	2024-29p	-1.3	1.1	1.1	1.4	4.7

Source: *National Council of Applied Economic Research (NCAER) and Frost and Sullivan Analysis.* ***Note****: Income groups are classified into five categories namely lower income, lower middle class, middle class, upper middle class and high income.*

1.1.4 Increasing Private Final Consumption Expenditure

"Emerging markets are expected to propel global private consumption (PFCE) growth, fuelled by rising incomes, expanding e-commerce, and larger consumer bases. The markets will outpace advanced economies with faster purchasing power growth and digital commerce adoption."

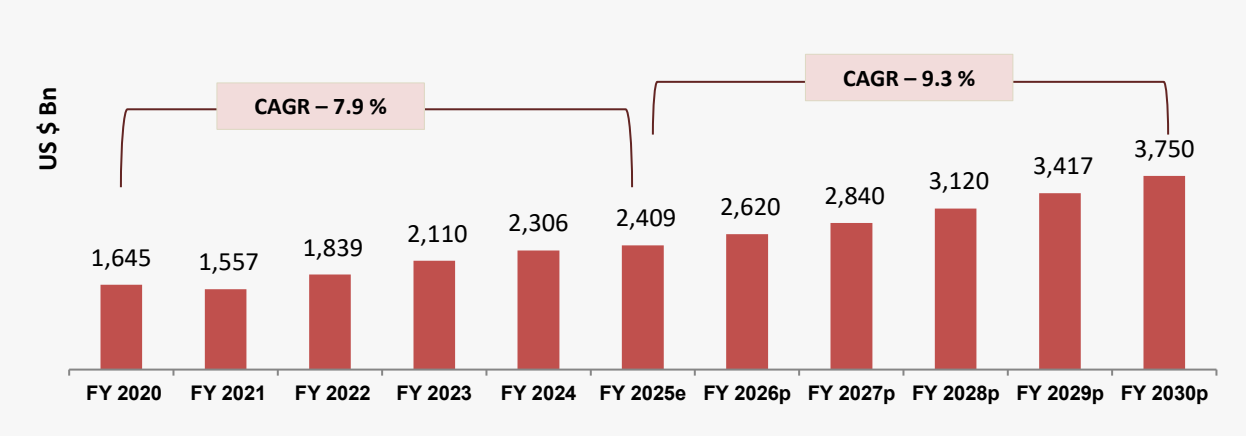
Private final consumption is the total household expenditure on goods and services, serving as a key indicator of domestic demand and economic health. The private final consumption (PFCE) on a global level is expected to be driven by the developing economies due to a larger population in China and India and the high per capita income growth rate. Rising purchasing power in developing economies like India and China, will be a major force of growth for PFCE. Globally, domestic consumption rates have occupied a significant share in GDP and are expected to remain high in the long run, with the availability of goods and per capita income of households increasing at a steady pace. The increasing domestic consumption rate can also be attributed to the rise of the e-commerce market in the country. The continued growth of cross-border trade and e-commerce is reshaping consumer behaviour, making a wider range of products more accessible to households. India's e-commerce market size, valued at US$ 144 billion in FY 2025, is expected to grow at 19.1% between FY 2025-2030p which is expected to increase the daily parcel volumes. This trend is expected to drive steady growth in domestic consumption, fuelled by greater convenience, improved logistics infrastructure, and expanding digital adoption across markets. Reflecting this, Figure 1.7 shows the trajectory of Private Final Consumption Expenditure (PFCE) from 2019 to projected 2029 across the North America, China, GCC, Europe, India, and the world average and Figure 1.8 illustrates India historical and projected PFCE.

Figure 1.7 Private Final Consumption Expenditure (PFCE) of India, GCC, China, NA, EU, ANZ and World Average, CY 2019-29p

Indicator		India	GCC	China	NA	European Union	ANZ	World
PFCE in US $ Billion	CY 2019	**1,645**	648	5,614	15,444	8,063	842	49,584
	CY 2024	**2,409**	823	6,963	20,605	10,095	1,101	59,749
	CY 2029p	**3,750**	1,201	8,553	23,887	12,252	1,264	70,963
CAGR % (CY 2019-2024)		**7.9**	4.9	4.4	5.9	4.6	5.5	3.8
CAGR % (CY 2024-2029p)		**9.3**	7.9	4.2	3.0	4.0	2.8	3.5
PFCE as a Share of GDP (CY 2024)		**61.6**	38.2	37.1	67.0	52.0	53.0	52.5

Source: *National Accounts Estimates of Main Aggregates United Nations Statistics Division (UNSD) and Frost and Sullivan Analysis.* ***Note:*** *Figures for India are for FY2020 – FY 2030*

Figure 1.8: Private Final Consumption Expenditure, India, FY 2020 – 2030p

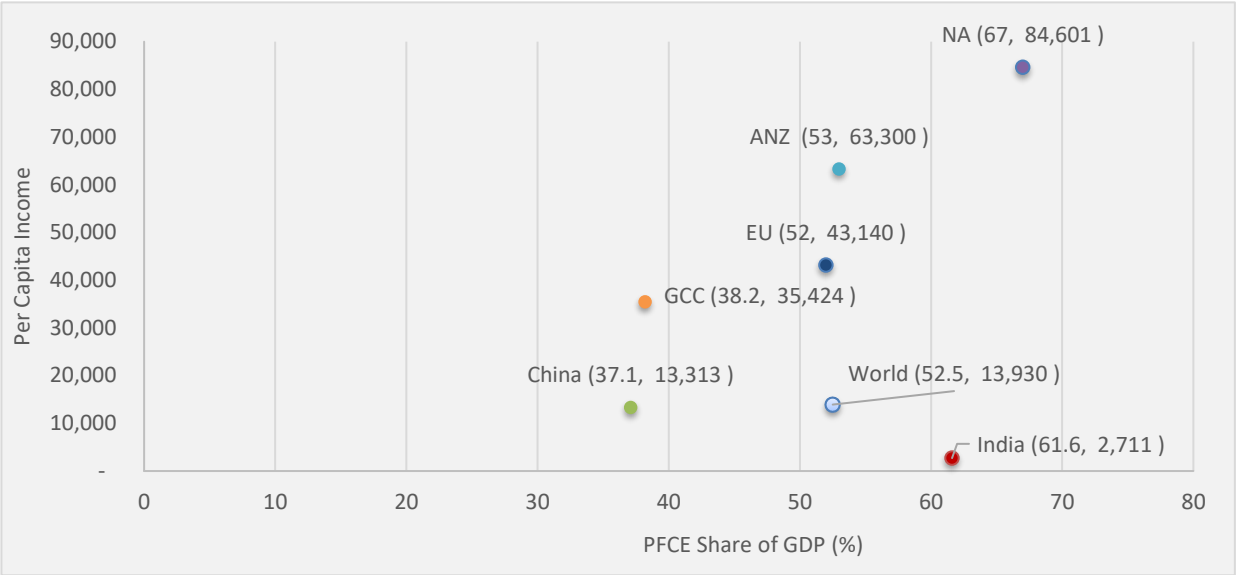


Source: National Accounts Estimates of Main Aggregates United Nations Statistics Division (UNSD) and Frost & Sullivan Analysis

India's PFCE growth signals an evolving consumption landscape, characterized by rising discretionary spending alongside traditional necessities. India's growing consumption in health and restaurants among other sectors is expected to increase rapidly. Another key driver of consumption is rising internet coverage and digital users boosting online sales and uplifting the e-commerce sector. An expanding customer base, especially in rural areas are driving broader consumption patterns. This e-commerce growth is pushing the need for efficient and quick logistics services, thereby contributing to the automation of warehouses assisted by the usage of material handling equipment and pallets. These infrastructural development of warehousing networks, on a broader level, is strengthening India's logistics capabilities and improving the reach of products across the country. This is enabling more efficient distribution and access to markets, including in remote regions. Figure 1.9: highlights the Private Final Consumption Expenditure and Per Capita Income of India, GCC, China, NA, Europe, ANZ and World in CY 2024.

"India's consumption boom in health, education and hospitality will be fuelled by its young, growing workforce - a key demographic edge over aging economies that will drive long-term growth."

Figure 1.9: Share of Private Final Consumption Expenditure in GDP (%) and Per Capita Income (in USD), India, GCC, China, NA, Europe, ANZ and World, CY 2024



Source: Frost and Sullivan Analysis

The structural shift in India's consumption patterns is supported by India's large and growing working-age population, which is expected to be the key pillar of domestic demand in the coming decade.

1.1.5 India's Demography

India's demographic profile presents a powerful engine for long-term economic growth working-age group representing a majority and the increasing participation of women in the workforce, reshaping India's economic landscape, supporting rising consumption and improved living standards.

POPULATION SPLIT BY AGE GROUP

In terms of population by age group, the developed economies have a higher aged group (60+) compared to the younger population (20-60). However, in Asia, where the population is increasing in emerging markets, there is a significant increase in the working population (20-60), especially in rapidly developing economies like India and China.

"India's youthful population, expanding middle class, and digital adoption will fuel consumption growth, outpacing aging economies."

India's growing population is expected to support PFCE and the growth of industries and economy. Higher younger age group, with better access to better education and employment opportunities is expected to result in higher incomes, bringing a rise in India's consumption. Additionally, increasing participation of women in the workforce is an important driver of India's demographic advantage. India's female labour force participation rate rose from 26% in 2020 to 33% in 2024 reflecting a structural shift towards more inclusive employment. This trend is leading to a rise in dual-income households, which is boosting disposable income, stimulating consumption across sectors. With a growing and more diverse workforce, India is better positioned to leverage its demographic dividend over the coming decades. Figure 1.10 illustrates the population split by age group in India from 2019 to projected 2029.

Figure 1.10: Population Split by Age Group, India, CY 2019 – 2029p

	Age Group (Units in Billion)				
Year	0-19	20-34	35-60	60 +	Total
CY 2019	0.46 (34%)	0.35 (26%)	0.41 (30%)	0.14 (10%)	1.36
CY 2024	0.48 (33%)	0.38 (26%)	0.45 (31%)	0.16 (11%)	1.46
CY 2029p	0.46 (30%)	0.38 (25%)	0.49 (32%)	0.19 (12%)	1.53

***Source**: World Population Prospects 2024, United Nations, Report of the Technical Group on Population Projections, National Commission on Population and Frost & Sullivan*

The median age of population in India is one of the lowest in the world, indicating future economic and consumption growth potential. Japan and Germany have a relatively higher median age. As the younger group has access to better education and employment opportunities in India, they will have higher incomes therefore increasing consumption. India's working-age population currently accounts for around 56% of its total population, amounting to approximately 819 million based on a 1.46 billion population, positioning it as one of the largest labour forces globally. Figure 1.11 presents the median age of the population by country for 2024, highlighting these differences across key nations.

Figure 1.11: Median Age of Population and Working Age Population by Country, 2024

Indicator	India	GCC	China	North America	European Union	ANZ	World
Median Age (years)	30	32	40	39	45	39	31
Working Age Population (Million)	819	37	950	234	260	21	6,500

***Source:** World Population Prospects 2024, United Nations, Report of the Technical Group on Population Projections, National Commission on Population, UN Population Division and Frost & Sullivan Analysis*

EVOLUTION OF POPULATION MIX -URBAN AND RURAL

About 2/3rd of India's population lives in rural areas. Over the years, population in the rural areas is shifting to the urban areas due to low income from agricultural activities, losses due to frequent crop failures, and job opportunities with higher wages in urban India. This will result in a shortage of workforce in rural areas opening up opportunities for increased mechanization of agriculture activities

The '100 Smart Cities Mission' implemented in 2015, is rapidly transforming current areas like slums into residential regions, extending cities with greenfield projects that will develop new areas and smart city initiatives for improving infrastructure of cities. This urbanization trend will significantly impact the country's food distribution, energy consumption, housing and education services. This rapid urbanization rate in India is an indicator of its developing economy.

1.2 GOVERNMENT GROWTH INITIATIVES – INDIA

India, one of the fastest-growing economies, is actively enhancing its infrastructure, attracting investment, and leveraging trade and investment opportunities. The country is making significant strides in expanding digitalization and diversifying its economy beyond agriculture. Government policies and investment initiatives highlight a strong commitment to positioning India as a prime destination for foreign investors. In addition to these initiatives, the government is placing a strong emphasis on building an integrated logistics and manufacturing ecosystem. Programs like PM Gati Shakti and the National Logistics Policy aim to reduce supply chain costs and improve multimodal connectivity, while schemes such as Make in India and PLI are encouraging domestic production and technology adoption. Together, these efforts are creating a business-friendly environment that supports efficiency, scalability, and long-term competitiveness. To support this vision, the government has launched several initiatives aimed at driving sustained economic and trade growth highlighted in figure 1.12.

Figure 1.12: Government Economic Growth Initiatives, India, CY 2019 – 2029

Initiatives	Sectors	Key Features
PM Gati Shakti (NMP)	Logistics, Infrastructure	• PM Gati Shakti and the USD 1.4 trillion infrastructure plan aim to reduce logistics costs from 14% to 8% of GDP by 2029 by developing an integrated multimodal transport network, including 35+ logistics hubs, 20,000 km of new highways, and improved port and rail connectivity—enhancing freight efficiency, transparency, and economic competitiveness.
National Logistics Policy (2022)	Logistics, Infrastructure	• The National Logistics Policy aims to reduce costs, enhance freight efficiency, and promote multimodal transport by modernizing India's logistics ecosystem. It introduces a unified logistics interface platform (ULIP) for real-time data sharing and aligns ministries for coordinated infrastructure development, complementing PM Gati Shakti.
Production Linked Incentives (PLI) Schemes 2.0	Automobile, Appliances, Electronics & IT, Pharmaceuticals, solar modules, metals & mining, textiles & apparel, and drones	• Launched in 2020, the Production Linked Incentive (PLI) Schemes aim to boost domestic manufacturing and global competitiveness across key sectors. With a USD 50 billion production target, the scheme has driven mobile manufacturing beyond USD 30 billion in 2023 and is now expanding to green hydrogen and specialty chemicals.
Make In India 2.0	All sectors	• The 'Make in India' initiative by the government facilitated investments, encouraging innovations in the manufacturing sector. The revamped Make in India initiative, collaborates with PM Gati Shakti, and aims to increase manufacturing's GDP share to 25% by 2029. The initiative has attracted more than USD 100 billion FDI since 2014, with 2024-29 targeting $50 billion annually. The program now prioritizes startups in advanced manufacturing like drones and EVs.
Goods and Services Tax (GST)	All sectors	• Products higher in value are charged with higher rates; with an average tax rate allocated for most. This uniformity in taxation, along with the removal of state-level taxes, has created seamless interstate movement of goods, simplified tax collection and implementation and improving convenience in intrastate transportation matters
Trade Policy	Agriculture, Manufacturing and services	• India concluded FTAs with UAE (2022), Australia (2023), and EFTA (2024), UK (2025) – boosting the annual bilateral trade and plans on finalizing agreements with other countries in the coming future including EU, Israel, and GCC; targeting USD 1.2 trillion total exports by 2029.
Investment Policy	Agriculture, Manufacturing, Infrastructure and services	• Over the past two decades, India has liberalized investment policies, easing restrictions and driving significant FDI inflows into manufacturing, ICT, transportation infrastructure, and energy. Between 2019–2024, key reforms included allowing full foreign ownership in coal mining, contract manufacturing, and insurance brokerage via the automatic route.
Digital India initiative	E-commerce, IT	• Building digital infrastructure, promoting e-governmental digital services and increasing digital literacy are the key objectives of this initiative. Digital India aims to implement public Wi-Fi hotspots and create a national information infrastructure expected to enhance efficiency and productivity.
ONDC (Open Network for Digital Commerce)	Online Retail, E-commerce, MSMEs	• ONDC is a government-backed, protocol-based network aimed at democratizing digital commerce by connecting buyers and sellers across apps. It empowers small retailers, curbs platform monopolies, and enhances MSME visibility and consumer choice. Now scaling nationwide, it integrates logistics, payments, and inventory to boost inclusion, competition, and last-mile delivery.
Self-Reliant India (Atmanirbhar Bharat Abhiyaan)	Agriculture Supply Chain, Human Resources and Financial System	• The five main pillars of this scheme are – Economy, Infrastructure, System, Vibrant Demography, and Demand. Sectors covered under these initiatives include Supply Chain Reforms for Agriculture, Rational Tax Systems, Simple & Clear Laws, Capable Human Resources, and a Strong Financial System.

Source: *PM Gati Shakti, National Logistics Policy, Make in India 2.0, Department for Promotion of Industry and Internal Trade, Ministry of Commerce and Industry and Frost & Sullivan Analysis*

2 INDIA AS GLOBAL MANUFACTURING HUB

"India is steadily positioning itself as a global manufacturing hub, with rising exports driven by a large domestic market, focused trade policies, and supply chain shifts amid global realignments."

India's overall economic growth and macro trends continue to indicate a strong upward trajectory in industrial output, particularly in the manufacturing sector. The Purchasing Managers' Index (PMI) has strengthened notably, rising from an average range of 42.0–52.0 in 2020 to an elevated range of 57–58 in the first half of 2025, reflecting sustained momentum and improving sectoral confidence. This growth is driven by a series of government-led initiatives such as the Production-Linked Incentive (PLI) schemes, infrastructure investments, and policies aimed at boosting domestic production and exports. Reflecting this momentum, India's Manufacturing Purchasing Managers' Index (PMI) recorded a robust 56.3 in April 2025, showcasing resilience and expansion in contrast to the global PMI, which remained relatively subdued at around 49.5. The demand is being effectively met by the growing number of registered manufacturing enterprises, which are playing a pivotal role in sustaining the sector's expansion.

2.1 POSITIONING OF INDIA AS A GLOBAL MANUFACTURING HUB

India has emerged as a preferred global manufacturing destination, with exports growing from USD 229 billion in FY2020 to USD 292 billion in FY2025, supported by progressive government policies like the Production Linked Incentive scheme and Make in India initiative. Projections indicate strong 11.8% annual growth, potentially reaching USD 510 billion by FY2030, which would significantly increase manufacturing's contribution beyond its current 12.5% share of GDP.

2.1.1 India's Global Manufacturing

"Skilled workforce, policy reforms, and growing FDI are shifting focus to India being a key country for outsourced manufacturing. Potential U.S. tariff shifts are driving firms to diversify production, boosting India's role in global supply chains."

India is increasingly positioning itself as a critical player in global manufacturing, supported by structural reforms, cost competitiveness, and supply chain diversification by multinational corporations. Global manufacturers are adopting a "China+1" strategy, and India is emerging as a preferred destination due to its large talent pool, improving infrastructure, and favourable policy environment. Government initiatives such as 'Make in India' and Production Linked Incentive (PLI) schemes are driving significant investments in key sectors, including electronics, automotive and EV components, pharmaceuticals, chemicals, and textiles. This transformation is further accelerated by global realignment efforts aimed at building resilient and diversified manufacturing ecosystems. India's growing capabilities in advanced manufacturing technologies such as automation, robotics, and Industry 4.0 are enhancing its competitiveness against traditional hubs. As India scales its global manufacturing footprint, the need for efficient, digitally integrated, and resilient supply chains is becoming more critical. Modern warehousing, material handling equipment (MHE), and pallet systems are increasingly vital to meeting global standards.

Additionally, India's manufacturing expansion is fostering the growth of an integrated logistics and industrial ecosystem that supports faster, cost-effective operations. The rise of industrial clusters near major transport corridors is improving connectivity and reducing transit times for both domestic and export markets. Strategic partnerships between manufacturers and third-party logistics providers are driving the adoption of advanced inventory management systems and real-time tracking solutions. Furthermore, sustainability is becoming a key focus, with companies incorporating green warehousing practices and energy-efficient technologies. These developments, coupled with an increasing emphasis on workforce upskilling in automation and digital tools, are positioning India as a competitive and future-ready manufacturing hub.

Figure 2.1 illustrates the key reasons companies are opting to outsource manufacturing activities in India.

Fig 2.1. Key reasons for companies choosing to outsource manufacturing activities in India

Factors	Key Highlight
Global Leadership Position	India ranked 1st in Kearney's 2023 Global Services Location Index, ahead of China and the U.S., driven by talent availability, digital capabilities, and cost competitiveness.
Expansive and Cost-Effective Workforce	With a labour force exceeding 700 million, India offers a wide talent pool across skill levels at competitive wage rates, enabling companies to reduce production costs without sacrificing quality.
Improved IP Protection Environment	Strengthened IP policies led to a 15%+ rise in resident patent applications in 2024, promoting innovation and encouraging foreign firms to conduct R&D in India.
Simplified Tax Structure (GST)	The implementation of GST has streamlined India's previously complex tax system, improving business compliance and reducing logistics inefficiencies for manufacturers.
Rising Investor Confidence	India reached USD 1 trillion in cumulative FDI since April 2000, with USD 67.7 billion in gross inflows during April–January 2025, up 12.4% YoY, reflecting trust in India's economic stability, reform orientation, and market potential.
China+1 Strategy & Supply Chain Realignment	Global firms are increasingly choosing India under the China+1 strategy due to rising tariffs and regulatory hurdles in developed economies, seeking India's cost-efficient, stable, and policy-supportive environment.
Sectoral Attractiveness	India is emerging as a top destination for investment in electronics, automotive, food processing, chemicals, and paint is expanding its role in pharmaceutical, chemical, and engineering global supply chains.

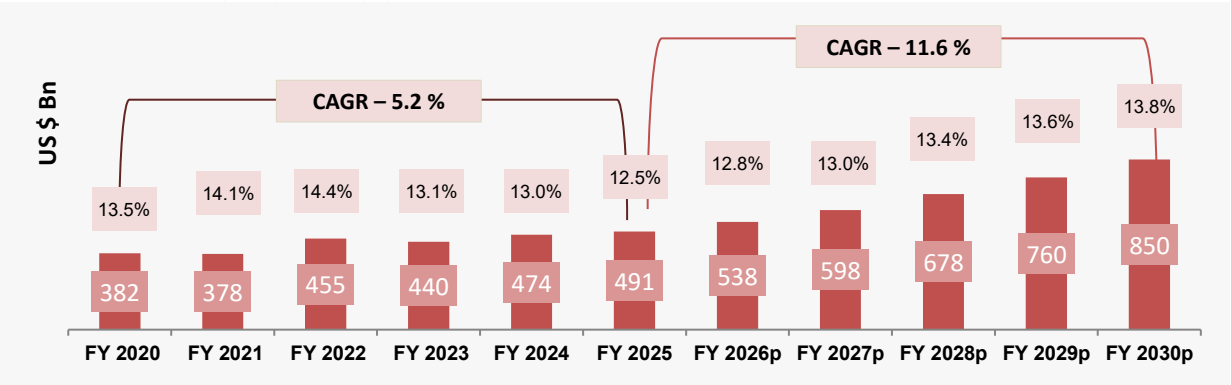
Source: *Frost and Sullivan Analysis*

2.1.2 India's Manufacturing contribution to GDP

India's domestic manufacturing engine continues to gather pace, propelled by brisk export growth and a buoyant home market. The manufacturing sector's size is expanding from a current USD 491 billion in FY 2025, set to approach USD 850 billion by FY 2030 expected to grow at 11.6% from FY 2025-30. Even though the sector's share of GDP eased from 13.5% in FY 2020 to 12.5% in FY 2025, it is expected to rebound gradually to 13.8% by FY 2030. The sector has shown notable diversification, with traditional industries being complemented by growing high-tech segments like electronics and EVs. Traditional sectors like petrochemicals, steel, cement, and automobiles play an important role in the growth and development of the country. Figure 2.2 illustrates the size of India's manufacturing sector and its contribution to GDP from FY2020 to FY2030.

"India's manufacturing output is expected to grow at 11.6 % CAGR from FY2025 to FY2030, fuelled by PLI schemes, infrastructure investments, and booming domestic demand. With India's emergence as a global manufacturing hub, efficiency in supply chain solutions is being driven on demand."

Figure 2.2: Manufacturing Size and Contribution to GDP, India, FY 2020-2030p



Source: *National Accounts Statistics 2025, Ministry of Statistics and Programme Implementation and Frost and Sullivan*

X % ***Note:*** ***Figures in the red boxes represent the percentage of manufacturing contribution to GDP (Value Added)***

2.2 DOMESTIC MARKET GROWTH

The ongoing expansion in manufacturing, retail, FMCG, and logistics sectors, along with the rapid growth of e-commerce, is driving strong demand for material handling equipment (MHE) and pallets. Government initiatives like 'Make in India' have bolstered output in these industries by promoting domestic production and modernizing supply chains. As production and consumption grow, the need for efficient, scalable, and digitally integrated supply chains supported by advanced material handling infrastructure is becoming increasingly critical. Key end-user industries, including Automotive, Food & Beverage, FMCG, and Online & Modern Retail, will play a pivotal role in sustaining this demand.

India's manufacturing sector is evolving into a globally competitive hub, driven by initiatives like Make in India and the PLI schemes. Adoption of Industry 4.0 technologies, focus on sustainability, and improved logistics under PM Gati Shakti are enabling manufacturers to build agile, efficient, and export-ready operations, strengthening their role in the country's economic growth. Figure 2.3 illustrates the key drivers propelling the growth of India's manufacturing sector.

Figure 2.3. India's Key Drivers Fuelling the Growth of India's Manufacturing Sector:

Industry	Key Features
Sizeable Domestic Market	India's 1.4+ billion population, 6%+ annual growth in the middle class, and rising per capita income are fuelling demand. INR depreciation (from ~₹73/USD in 2021 to ~₹87.87USD in mid-2025) and import tariffs have made domestic products more cost competitive.
Strategic Trade Policies	Sector-specific policies and Free Trade Agreements (FTAs) are boosting exports in key sectors—pharma (8.9% CAGR), electronics (7.9%), machinery (8.3%), and chemicals (7.1%)—while the UK-India FTA is expanding textile exports.
Geopolitical Realignments	Trade tensions and high tariffs on Chinese and Bangladeshi goods have prompted global retailers like Walmart to shift sourcing to India, which offers moderate tariff rates and policy stability.
Government Initiatives	PLI schemes across 14 sectors, the National Manufacturing Mission (2025), PM Gati Shakti, and Startup India are driving investment, improving logistics, and supporting industrial clusters.

Source: *Frost & Sullivan Analysis*

2.2.1 Coverage Of Select Manufacturing Industries

India's manufacturing landscape is anchored by diverse sectors such as food and beverages (F&B), fast moving consumer goods (FMCG), automotive, and industrial goods. The F&B industry is expanding rapidly, driven by rising urban demand, the growth of online grocery and food delivery platforms, and government-backed initiatives like PMKSY and PLI. FMCG, supported by increasing disposable incomes, rural market penetration, and digital adoption, continues to see steady growth as organized retail reshapes consumption. Together, these consumer-focused sectors form a strong foundation for domestic manufacturing and trade. The automotive and industrial segments further strengthen India's manufacturing base. Automotive production has rebounded, with growing demand for passenger vehicles, two-wheelers, and EVs, supported by supply chain stabilization and a rising middle class. Meanwhile, industrial goods, including steel, cement, paints, chemicals, and consumer electronics, are gaining from infrastructure spending, production incentives, and a shift toward sustainable materials and energy-efficient products. These combined developments reinforce India's position as a competitive manufacturing hub capable of meeting both domestic and global demand.

2.2.1.1 Food and Beverages

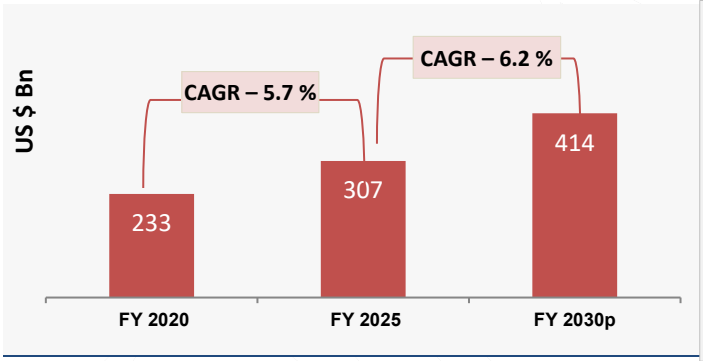
"Being one of the key sectors, F&B grew to $307 billion (7.9% of GDP) in FY 2025, with omnichannel and online retail as a key factor of growth, driving the demand for organized cold chain logistics."

India's Food & Beverages (F&B) sector contributed about 7.8% to GDP in FY 2025, reaching USD 307 billion, up from USD 233 billion in FY 2020. It remains one of the country's largest employment generators. The pandemic accelerated a shift to online and omnichannel purchasing, especially for groceries and ready-to-eat meals, driven by lockdowns and rising digital adoption. In FY 2025, food and beverage (F&B) manufacturing accounted for approximately 7.9% of India's GDP. With F&B exports growing, and rising urban demand, the sector continues to diversify, supported by the rapid growth of online grocery platforms and food delivery services. In developed countries like the USA, per capita food consumption is almost 5 times India's per capita consumption, signifying the potential for growth in the Indian food market as the per capita income of the country rises.

Government programs such as the Pradhan Mantri Krishi Sinchayee Yojana (PMKSY), which focuses on building modern food processing infrastructure, and the Production Linked Incentive (PLI) scheme have helped boost investment, innovation, and formalization in the sector. These initiatives have strengthened supply chains, supported small and medium enterprises, and increased value addition across the food and beverage industry. At the same time, the rapid growth of food delivery platforms and quick commerce has changed how consumers shop. Quick and efficient delivery of food has increased the need for a strong, technology-enabled logistics network to support this shift.

As shown in Figure 2.4, India's Food and Beverages market is projected reflecting this fundamental shift in consumption patterns and the infrastructure needed to support it.

Figure 2.4. Food and Beverages Market Size, India, FY 2020 - FY2030p



Key Growth Drivers:

- Rising disposable income and urbanization driving demand for packaged and convenience foods.
- Growing middle class and young population fuelling consumption of premium and global products.
- 100% FDI allowance attracting global investments in food processing.

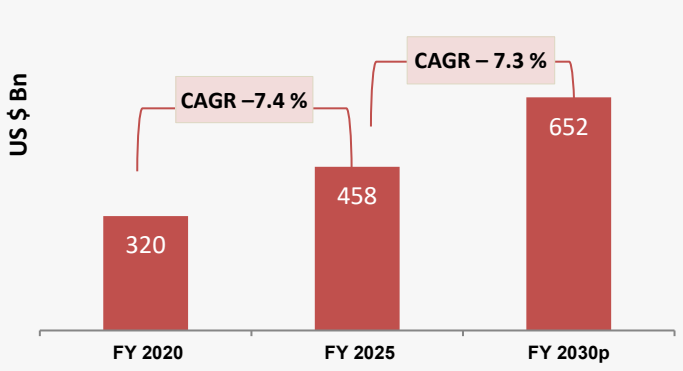
Source: *National Accounts Statistics 2025, Ministry of Statistics and Programme Implementation and Frost & Sullivan Analysis*

2.2.1.2 FMCG

The FMCG industry in India has demonstrated strong and consistent growth, driven by favourable demographic trends and evolving consumer behaviour. Key growth drivers include the rise in disposable income, rapid urbanization coupled with deeper rural market penetration, and a notable surge in online retail sales. These factors have contributed to a robust expansion trajectory, with the sector expected to maintain an accelerated pace in the coming years as digital adoption and organized retail continue to reshape consumption patterns across both urban and rural landscapes.

Figure 2.5 presents the FMCG market size in India from FY2020 to FY2030 (projected), highlighting the sector's steady growth trajectory.

Figure 2.5 FMCG Market Size, India, FY 2020-2030p



Key Growth Drivers:

- Rise in demand for packaged goods driven by urbanization and smaller households.
- Growth in rural consumption due to better connectivity and rising incomes.
- E-commerce and modern retail enhancing product accessibility and reach.

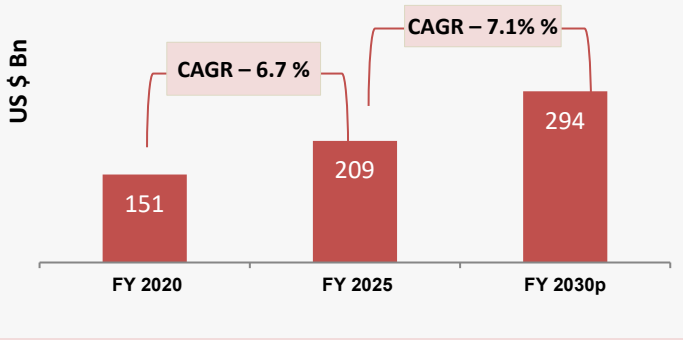
***Source**: National Accounts Statistics 2025, Ministry of Statistics and Programme Implementation and Frost & Sullivan Analysis*

2.2.1.3 Automotive

"Rebounding strongly, India's automotive sector is led by two-wheelers and passenger vehicles as well as EV adoption, supported by PLI investments. Projected to reach 96.2 million vehicles in production by FY2030, the sector remains a key GDP contributor (targeting 12% share by 2026)."

India's automotive sector has rebounded strongly from the semiconductor shortages of 2020–2021, with the market growing at a robust CAGR of 6.7% between FY2020 and FY2025, rising from USD 151 billion to USD 209 billion. In FY2025, the industry produced 68.6 million vehicles with ease of supply chain disruptions and domestic demand. The two-wheeler segment continues to lead with a 76% market share, while passenger vehicles account for 16%, supported by rising middle-class demand and growing interest in compact EVs and SUVs. India's automotive sector has staged a notable recovery from the pandemic-era challenges, showing strong performance across segments. This resurgence is illustrated in Figure 2.6, which tracks the market size of India's automotive industry from FY2020 projected to FY2030.

Figure 2.6: Market Size of Automotive Industry, India, FY 2020-2030p



Key Growth Drivers:

- Rapid EV adoption driven by subsidies, policy push, and environmental concerns.
- India as a global manufacturing hub, boosting vehicle and component exports.
- Growth in SUV demand, now the dominant passenger vehicle segment.

***Source:** Society of Indian Automobile Manufacturers (SIAM) and Frost & Sullivan Analysis*

The industry has overcome semiconductor shortages and supply chain disruptions that limited growth from 2019–2022, with FY2025 production showing strong growth driven by rising per capita income, higher private final consumption expenditure (PFCE), and continued government support through the Automotive Mission Plan 2016–26 and Make in India. EV adoption has surged, with FY2025 sales reaching 2.04 million units—nearly five times the 0.41 million sold in FY2022. As of March 2025, India had over 12,000 public charging stations. The EV segment recorded 15.7% year-on-year growth, reached 7.8% of total vehicle sales, and outpaced the broader auto market, driven by NITI Aayog's policy push and COP26 commitments. The PLI scheme for automotive and advanced components includes a USD 3.5 billion (INR 259.38 billion) outlay, with USD 3.1 billion (INR 250.00 billion) committed by end-2024 and USD 39 million (INR 3.22 billion) disbursed in FY2025. EV production grew 34% in FY2025, led by e-scooters (65% of EV sales), while commercial vehicle sales rose due to logistics and infrastructure expansion. With policy support and rising demand, the sector remains a key pillar of India's manufacturing growth and is poised for sustained expansion beyond FY2025.

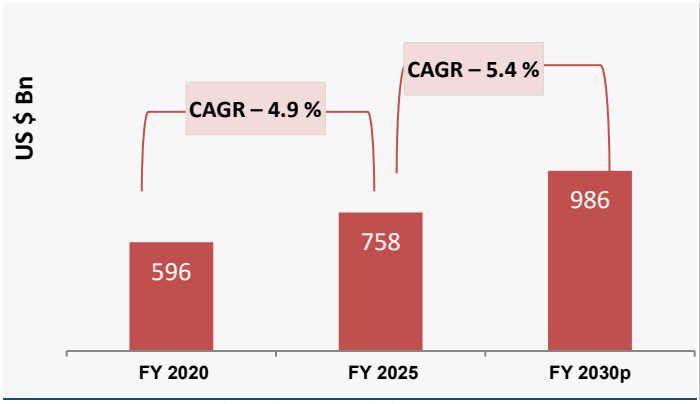
2.2.1.4 Industrial and Others sectors (Steel & Cement, Paints, Chemicals, Consumer Electronics)

"India's manufacturing growth is strongly driven by textiles, steel, and cement, backed by high demand and government support. Infrastructure programs like Bharatmala and the National Infrastructure Pipeline are boosting steel and cement production, while textiles are being driven by sourcing shift in the global supply chain."

India's industrial sector, including steel, cement, paints, chemicals, and consumer electronics, has emerged as a key pillar of economic growth. The sector's value has grown steadily, from USD 596 billion in FY2020 to USD 758 billion in FY2025 and is projected to reach USD 986 billion by FY2030. This expansion is underpinned by rising infrastructure spending, government-backed production incentives, and growing demand from real estate, automotive, and manufacturing clusters. Steel and cement industries are seeing increased investments as housing, road, and industrial development projects gain momentum. Simultaneously, the consumer electronics and chemical segments are benefiting from the shift towards domestic manufacturing and higher rural and urban consumption.

With policy support such as PLI schemes and phased manufacturing programs (PMP), India is strengthening its position as a global manufacturing hub for industrial goods. Enhanced supply chain networks, warehousing infrastructure, and technology adoption are further enabling cost-efficient, scalable production. As India aligns with global sustainability standards, demand for green building materials, eco-friendly chemicals, and energy-efficient appliances is also rising, opening new opportunities within industrial value chains. The growing share of this segment in India's GDP underscores its central role in the country's long-term economic strategy. Additionally, recent labour unrest and political instability in key competitor markets such as Bangladesh have prompted global buyers to re-evaluate their sourcing models, resulting in a gradual shift of production mandates to India. With its large skilled workforce, improving infrastructure, and strengthening compliance ecosystem, India is emerging as a preferred alternative for global textile supply chains looking for reliability, scale, and resilience. As illustrated in Figure 2.7, these competitive strengths are driving significant transformation in India's Industrial goods and Others which we include steel and cement, paints, chemicals and consumer electronics sector from FY2020 through FY2030.

Figure 2.7: Market Size of Industrials and Other sectors (USD Billion), India, FY 2020-2030p



Key Growth Drivers:

- Infra push under PM Gati Shakti and NIP is driving demand for industrial goods and construction equipment.
- PLI schemes and Make in India are boosting investments in machinery and capital goods.
- Automation and tech adoption across industries is increasing demand for advanced industrial systems.

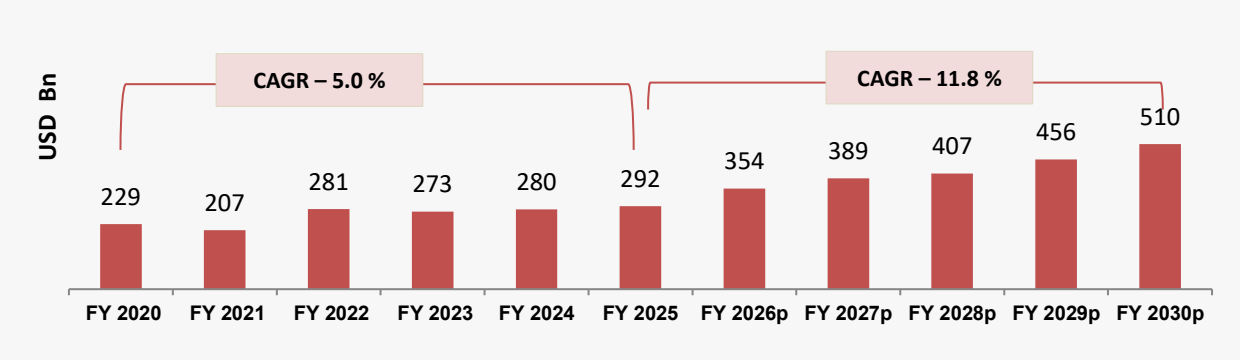
Source: *National Accounts Statistics 2025, Ministry of Statistics and Programme Implementation (MoPSI) and Frost & Sullivan Analysis*

2.3 MANUFACTURING EXPORTS

The broadening manufacturing base, supported by both traditional and emerging high-growth segments, is directly contributing to India's export performance and enhancing global competitiveness. Several factors are driving this export momentum, including rising global demand for Indian pharmaceuticals and specialty chemicals, improved cost competitiveness in electronics manufacturing (particularly mobile phones and components), and increasing capabilities in high-value defence equipment. A notable highlight has been the rapid expansion of defence manufacturing, with exports growing significantly enabled by policy reforms including increased FDI limits to 74% in defence production, import restrictions on over 400 defence items to boost domestic manufacturing, and growing private sector participation. The is expected to diversify India's manufacturing exports into high-value defence equipment and

technologies. This positive trajectory is captured in Figure 2.8. which presents India's manufacturing export performance and projections from FY2020 through FY2030.

Figure 2.8: Manufacturing Exports (USD Billion), India, FY 2020-2030p



Source: *Ministry of Commerce and Industry, Economic Survey 2024-25, Ministry of Statistics and Programme Implementation and Frost & Sullivan Analysis*

2.4 Foreign Direct Investment

"Key initiatives like Make in India, PLI schemes, and PM Gati Shakti are boosting investment, infrastructure, and competitiveness, with a focus on sectors such as automotive, electronics and industrials."

Cumulative (From April 2000 to March 2025) FDI inflows into manufacturing reached USD 128.7 billion, reflecting strong investor confidence in the country's economic reforms and manufacturing capabilities. Openness to 100% FDI in sectors such as textiles, defence manufacturing, food processing, e-commerce, and petroleum has significantly expanded its investment landscape. With increasing FDI and strong consumer-driven demand, India's manufacturing sector is witnessing expanded output, which is supporting both domestic consumption and export growth. To accommodate this scale, the supply chain sector is evolving rapidly, with notable advancements in automation, robotics, and vertical warehouse development enabling more efficient land use and inventory management. Between April 2000 and March 2025, India attracted significant FDI into the manufacturing sector, with Industrial Goods receiving the highest inflows, followed closely by the Automotive sector.

India has witnessed a steady flow in FDI, particularly in the manufacturing sector with the uptick in manufacturing activities amplifying the demand for logistics and supply chain services. As the manufacturing sector continues its significant growth, supply chain resiliency and efficiency will play a key role by impacting sales numbers with better customer experience and demand fulfilment. A strong logistics and distribution network will work to serve both the domestic and international markets.

2.5 Policies To Boost Manufacturing Investment

Government policy initiatives such as FDI reforms, Privatization, Make in India, Production linked Incentives for manufacturing sectors and National Master Plan for Multimodal Connectivity have significantly improved investor confidence. In addition to these initiatives, the government is actively driving reforms aimed at making India a global manufacturing hub. Simplified FDI norms, faster approval processes, and targeted incentives under schemes such as Make in India and PLI have created a more predictable investment environment. Furthermore, infrastructure programs like PM Gati Shakti and the National Master Plan for Multimodal Connectivity are integrating logistics networks, reducing operational bottlenecks, and improving connectivity between industrial clusters. Complemented by digitalization initiatives such as Digital India and regulatory simplifications under GST, these policies are fostering an ecosystem that supports supply chain modernization, operational efficiency, and long-term industrial growth.

These policy measures are also encouraging deeper collaboration between government agencies and industry stakeholders to streamline regulatory processes and enable faster project execution. By aligning industrial growth with sustainability objectives, the government is promoting the use of renewable energy, green manufacturing practices, and environmentally compliant infrastructure. Additionally, the focus on skill development programs and industry-academia partnerships is creating a future-ready workforce capable of supporting advanced manufacturing technologies. This holistic approach is not only strengthening India's competitiveness but also reinforcing its position as a strategic hub for global value chains.

Figure 2.9 outlines India's key national development plans and policies for 2024, emphasizing initiatives that support industrial growth and supply chain modernization:

Figure 2.9: National Development Plans and Key Polices, India, 2024

Initiatives	Sectors	Key Features
Foreign Direct Investments in manufacturing	IT, Electronics, Solar modules, Telecom, white goods, R&D	The Department for Promotion of Industry and Internal Trade (DPIIT) recorded a total of US$ 165 Billion FDI inflows from 2014–2024 in the manufacturing sector. In 2025, 100% FDI was approved in the space sector, and insurance sector caps were increased to attract higher foreign capital and boost domestic employment.
Make in India & Manufacturing Mission 2025	Mining, Manufacturing, Defence, Electronics, Renewable Energy, Infrastructure, Space	Make in India' is now aligned with Manufacturing Mission 2025, targeting 25% GDP contribution from manufacturing. New initiatives include space tech parks and centers of excellence via IN-SPACE in Karnataka and other states. It continues to support investment, innovation, and robust industrial infrastructure.
Production Linked Incentive (PLI) Schemes	Automobile & Components, Electronics, Pharmaceuticals, Solar Modules, Medical Devices, Textiles, White Goods, Semiconductors, Food, Footwear, and Toys	The PLI outlay rose 76% to ₹19,500 crore for FY2025–26. Electronics and semiconductors are major beneficiaries, with $2.7 Billion allocated, aiming for 91,000 new jobs. Newly added sectors include toys and footwear, expanding India's manufacturing competitiveness globally.
FAME (Faster Adoption and Manufacturing of Hybrid and Electric Vehicles)	Automobile & Electric Vehicles (EV)	Separate scheme providing subsidies and incentives to accelerate EV adoption and local manufacturing of EV components, batteries, and charging infrastructure. Complements PLI in auto sector.
Electronics Manufacturing Clusters (EMC) Scheme	Consumer Electronics	Creation of dedicated industrial zones with world-class infrastructure for electronics manufacturing, including reliable power, water, roads, common facilities (testing labs, training centers), and ready-to-use industrial plots, helping reduce costs and improve competitiveness.
PM Gati Shakti – National Master Plan	Transport, Industrial Corridors, Logistics, Supply Chain, Connectivity	With US$ 725 Billion planned for FY2021–26, the PM Gati Shakti integrates major infrastructure projects like Bharatmala (US$ 6B) and Sagarmala (US$ 5.7 Billion). Over 208 major infrastructure projects are being tracked. Industrial clusters in textiles, defense, electronics, and pharma are included to strengthen logistics and reduce costs.
Skill Development & Innovation	Technical Education, AI, Space Tech, Advanced Manufacturing	New NSTIs in five cities (e.g., Bhubaneswar, Chennai) support skill-building. Initiatives like IndiaAI Compute Facility and BharatGen focus on AI infrastructure and Indian-language AI models. The Atal Innovation Mission (AIM) continues fostering grassroots innovation.

Source: Directorate General of Training (DGT), Ministry of Skill Development and Entrepreneurship (MSDE),Compendium of PM GATISHAKTI, (National Master Plan for Multimodal Connectivity), Ministry of Commerce and Industry, Make in India Department for Promotion of Industry and Internal Trade (DPIIT), and Frost & Sullivan Analysis

3 SUPPLY CHAIN MARKET

3.1 SUPPLY CHAIN MARKET DEVELOPMENTS AND SEGMENTS

"India's supply chain is evolving into an AI-powered, multimodal, and globally integrated ecosystem, backed by reforms like PM Gati Shakti and digital tools such as ULIP and E-Sanchit."

India's supply chain ecosystem has transformed into a strategic pillar of manufacturing and export growth with integrated, digitally enabled network covering procurement, production, warehousing, and delivery. This evolution is driven by structural reforms, large-scale infrastructure investments, and rising industry expectations for speed, scale, and resilience. As India integrates further into global value networks (GVNs), domestic companies are upgrading supply chains to meet international benchmarks on reliability, traceability, and ESG compliance.

Sectors such as e-commerce, FMCG, pharmaceuticals, and automotive now demand highly specialized flows, including cold chain storage, just-in-time deliveries, and responsive distribution models. These requirements are addressed not by standalone logistics solutions but by modular, tech-driven supply chain systems embedded into larger operational strategies.

The government has played a central role in enabling this transformation. Initiatives like PM Gati Shakti, ULIP, Bharat Mala, and Sagarmala have improved multimodal connectivity and digital transparency, helping businesses coordinate supply chains across distances with greater efficiency. Regulatory simplifications, digital customs, and paperless EXIM systems have further enhanced trade flows and reduced friction.

Supply chains consist of several key cost components, such as freight, warehousing, inventory carrying, and sourcing. While each sector allocates resources differently, transportation and storage remain the largest contributors. This reflects the expanding footprint and complexity of modern operations, especially in high-volume consumer sectors. Companies are now investing in AI-based demand planning, IoT tracking, and automation to build agile, future-ready systems. As supply chains become integral to business strategy, understanding sector-specific cost patterns and prioritizing smart investments are critical for long-term competitiveness.

Further, the shift in the supply chain market at India is being replaced with cost-centric operation to value-based operations. End-to-end visibility, tracking in real-time, and automated decision-making have become priorities in businesses in the face of increasing demand variability. Also, sustainability has come to play its role, where firms are acquiring electric fleets, energy-efficient warehouses and reusable packaging in order to cut costs and be in line with the world of trade. This transition is arriving at the development of a future prepared chain network which is adaptive, visible and coupled with the national and worldwide market.

Organized and Unorganized Supply Chain Activities

India's supply chain market is gradually transitioning from a largely unorganized structure to a more formalized ecosystem. Unorganised players operate in the road freight transport space, dominate the market, typically operate small fleets, rely on basic storage facilities, and lack access to digital tools. In contrast, organized providers, currently accounting for roughly 15% to 20 % of the market, are expanding rapidly, driven by GST reforms, large-scale infrastructure development, and the growing role of 3PL and tech-enabled logistics firms. E-commerce growth and increasing demand for integrated solutions have accelerated this shift. Government initiatives such as the National Logistics Policy and ULIP, combined with private investment in automation and standardized assets, are further enabling this formalisation. While the market is maturing, challenges such as low multimodal adoption and limited technology penetration in smaller operations remain, indicating significant headroom for future growth.

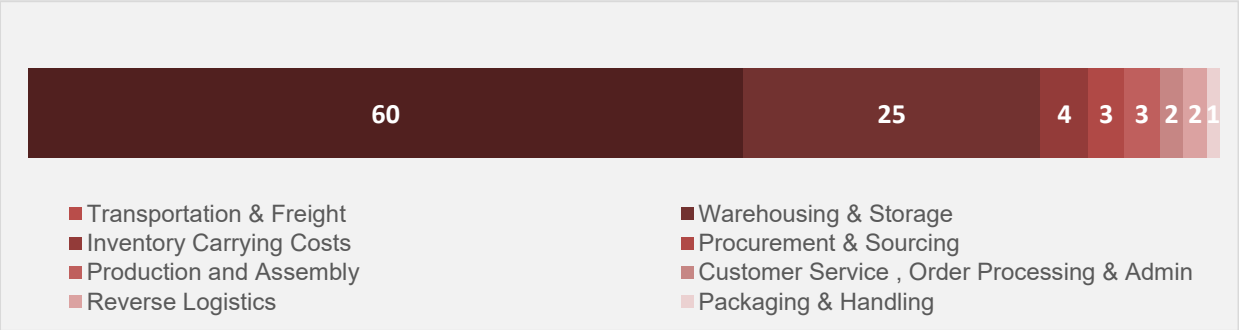
While formalisation continues, the focus is shifting towards optimizing individual supply chain activities such as freight management, warehousing, inventory handling, and sourcing. Companies are increasingly adopting modular, tech-enabled solutions to address sector-specific needs, for instance, cold chain for pharmaceuticals or automated picking systems for e-commerce. This shift is enabling businesses to reduce inefficiencies in high-cost components while improving service levels and scalability, setting the stage for a more activity-driven view of supply chain competitiveness.

3.2 Spending on Supply Chain Activities

"India's supply chain spending is increasingly prioritizing value over scale, with investments directed toward agile models, multimodal logistics, and tech-enabled visibility."

Logistics, warehousing, and inventory holding account for the largest share of supply chain operating costs in India, making them the primary drivers of overall supply chain spending. Transportation alone forms the largest share due to high fuel expenses, fragmented trucking operations, and underutilized return trips. Warehousing adds significant cost through storage, handling, and temperature-controlled infrastructure, while inventory carrying costs remain elevated due to long lead times and high safety stock requirements. Figure 3.1: Components of Supply Chain Cost by Percentage, FY2025

Figure 3.1: Components of Supply Chain Cost (%), FY 2025



***Source**: Frost and Sullivan Analysis*

Transportation and freight are the dominant cost components of the supply chain, primarily driven by high fuel prices, vehicle operations, and logistics network expenses. Warehousing and storage follow as significant cost drivers, influenced by facility rentals, equipment requirements, and labour. Inventory-related costs also contribute notably, reflecting capital tied up in unsold goods and resulting in financial inefficiencies. Additionally, procurement and production expenses stemming from raw material sourcing and the manufacturing cycle further increase the total cost structure. Though smaller in share, functions such as reverse logistics, packaging, customer service, and order processing remain strategically important. An integrated approach to cost optimization across all supply chain elements is therefore essential.

India's logistics cost stands at 14% of GDP (CY 2024), nearly twice that of developed economies such as the US (8%), Germany (8.1%), and Japan (8.5%), encompassing transportation, warehousing, inventory management, packaging, and other supply chain activities. This highlights inefficiencies in both freight and storage segments. In contrast, developed nations benefit from standardized logistics ecosystems featuring uniform vehicle specifications, advanced route planning systems, seamless multimodal integration, and technology adoption enabling automation. These practices enable faster goods movement, lower inventory costs, and greater operational predictability. Additionally, extensive palletization and racking automation enhance inventory handling, reduce reliance on manual labour, and improve large-scale warehouse efficiency.

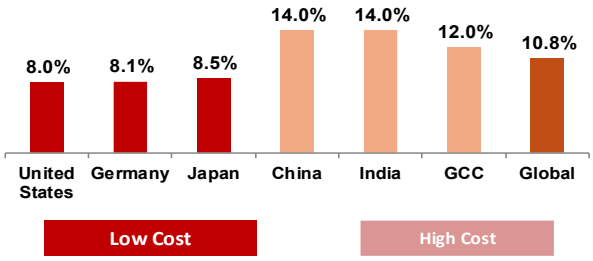
Indirect logistics costs, projected to increase from USD 155.4 billion in FY 2025 to USD 189.1 billion by FY 2030, encompass a range of supporting activities beyond core freight and warehousing expenses. These include inventory carrying costs such as capital cost, insurance, and depreciation; packaging and handling costs related to materials and labour; reverse logistics for returns, refurbishment, and disposal; and administrative functions covering order processing, compliance, and customer service. These costs are shaped by operational inefficiencies, market fragmentation, and the predominance of unorganized service providers. Over the next five years, with gradual improvements in logistics infrastructure, technology adoption, and process integration, these costs are expected to become more streamlined, supporting better overall supply chain efficiency, as shown below,

India's logistics costs are projected to grow at a CAGR of 6.4 percent between FY 2025 and FY 2030, with direct costs increasing at 7.3 percent and indirect costs at 4.0 percent. The share of indirect logistics costs is projected to decline from 28% to 25% between FY 2025 and FY 2030, driven by supply chain efficiencies from modernization and automation.

High Logistics Costs: A Barrier to Efficiency and Global Competitiveness in USD Billion

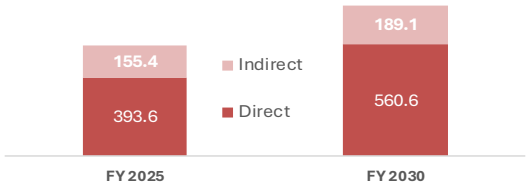
India's supply chain sector faces structural inefficiencies that affect both transportation and storage of freight, leading to higher costs and lower reliability compared to developed countries

Logistics Spending percentage to GDP, CY 2024



Developed countries typically follow standardized vehicle sizes and specifications, enabling greater efficiency in freight movement, optimized route planning, and better integration with multimodal systems. Usage of advanced palletization and racking standards in leads to streamlined inventory flow, making it easier to automate and scale operations

Direct and Indirect Logistics spend, India, FY 2025- 30p



India's logistics ecosystem remains fragmented and largely unorganized, with limited digital integration and uneven infrastructure quality. However, ongoing modernization, automation, and better coordination among service providers are expected to reduce the share of indirect logistics costs over the next five years, even as overall logistics activity expands. This shift will be supported by investments in multimodal connectivity, technology adoption, and streamlined supply chain processes.

Source: *China Federation of Logistics and Purchasing, Fast Tracking Freight in India, Niti Aayog* ***Note****: Logistics costs – Direct (Transportation, warehousing, Freight Forwarding, Value Added Services) and Indirect (Inventory holding, higher transit costs associated with fragmented systems and infrastructure bottlenecks, costs associated with theft and damages to cargo).*

India's supply chain growth, fuelled by expanding trade and domestic consumption, underlines the need for modernization to avoid rising inefficiencies. Sectors such as food and beverages, e-commerce, and retail face elevated logistics costs due to cold chain requirements, fast delivery cycles, and complex distribution footprints. Automotive and industrial players, on the other hand, rely on precision-oriented supply chains with just-in-time (JIT) and multimodal transport, requiring highly reliable warehousing and efficient freight movement. Figure 3.2 highlights the supply chain spend across key industries for FY 2025.

Figure 3.2: Supply Chain Spend by Selected Industries, FY 2025

Industry	FY2020	FY2025	FY2030p	CAGR % (2020-2025p)	CAGR % (2025-2030p)
	Supply Chain Spend (In Billion USD)				
Food and Beverages	32	42.8	61.9	6	7.6
Ecom and Q Com	8.1	18.2	47	17.7	21
FMCG and Retail	55.7	80.9	118.5	7.8	7.9
Automotive	21.1	30.1	43.8	7.3	7.8
Industrials and Other sectors	81.5	103.9	140.2	5	6.2
Other Manufacturing	51.4	65.3	83.9	4.9	5.1
Total Supply chain	249.7	341.2	495.3	6.4	7.4

Source: *Frost and Sullivan Analysis,* ***Note:*** *(1) Industrials Includes Machinery, Cement, Steel, Chemicals, Consumer Electronics, Paints and Coatings (2) Other Manufacturing -Textiles, Pharmaceuticals, Fabricated Metals, Rubber and Plastics. Total of supply chain spending reflects selected industries including Food & Beverages, E-commerce & Quick Commerce, FMCG & Retail, Automotive, Industrial, and Other sectors.*

3.3 SUPPLY CHAIN INEFFICIENCIES

"India's supply chain still faces inefficiencies that hinder growth. By improving the use of pallets, upgrading MHE, and strengthening digital tracking, businesses can achieve significant cost savings and run operations more smoothly."

Despite ongoing advancements, India's supply chains remain burdened by structural gaps that impact cost, speed, and reliability. In food and beverages, limited refrigerated infrastructure results in spoilage and product losses. E-commerce and quick commerce experience inefficiencies from high return ratios and fragmented last-mile networks. FMCG and retail operators face challenges with rural distribution and load consolidation, while automotive and industrial sectors struggle with fragile cargo handling and complex reverse logistics. These challenges stem from fragmented infrastructure, underutilized automation, low palletization, and weak multimodal connectivity. In contrast to the seamless, standardized systems in developed economies, India's networks often lack optimization, causing delays, damage, and higher inventory costs. Figure 3.3 outlines the sector-specific challenges and potential benefits of modernization for FY 2025.

Figure 3.3: Sector-Specific Challenges and Modernization Benefits, FY 2025

Industry	Supply Chain Challenges	Benefits of Supply Chain Modernization
Food & Beverages	Seasonal peaks expose cold chain gaps and reefer shortages, increasing the risk of spoilage and supply disruptions	Strengthens cold chain integrity, minimizes spoilage, and enables real-time temperature monitoring
E-Commerce & Q-Commerce	High COD return rates, fragmented last-mile networks, peak-season capacity shortages, and restricted urban access strain last-mile logistics efficiency.	Enhances last-mile speed and accuracy, streamlines returns, supports dynamic routing and micro-fulfilment
Third-Party Logistics	Empty miles, underutilized return trips, irregular client demands, driver shortages, and rising fuel costs continue to hamper operational efficiency in transportation.	Increases fleet utilization, standardizes operations, reduces backhaul losses, and boosts operational efficiency
FMCG & Retail	Frequent handling of small packs, poor truckload utilization in rural markets, and elevated return volumes strain distribution efficiency.	Enables better demand forecasting, load consolidation, and expanded rural reach
Automotive	Automotive supply chains demand ultra-reliable JIT/JIS deliveries, careful handling of fragile parts, and face challenges with underutilized backhauls	Enables real-time tracking, prevents line stoppages, and improves returnable packaging flows
Industrials & Other Sectors	Industrials face challenges with heavyweight and oversized cargo, risk of precision part damage, and low efficiency on return legs.	Improves special cargo routing, reduces breakage, and increases outbound and inbound efficiency for project-based supply chains
Other Manufacturing	Pharma, textile, and metal supply chains face unique challenges—from regulatory and cold chain issues to fast fashion demands and raw material and logistics constraints.	Supply chain modernization boosts traceability and cold chain reliability in pharmaceuticals, streamlines production and sourcing in textiles, and enhances logistics, procurement, and recycling efficiency in metals.

Source: Frost and Sullivan Analysis Note: (1) Industrial & Other Sectors Includes Machinery, Cement, Steel, Chemicals, Consumer Electronics, Paints and Coatings (2) Other Manufacturing -Textiles, Pharmaceuticals, Fabricated Metals, Rubber and Plastics

Targeted interventions are transforming India's supply chain ecosystem. Technologies such as IoT-based asset tracking, bonded trucking, automated warehousing, and integrated logistics parks are enhancing traceability, reducing errors, and increasing throughput. Palletization has become a critical enabler, improving space utilization, reducing product damage, and speeding up handling, especially in modern Grade A warehouses. The growing adoption of material handling equipment (MHE) is also improving operational efficiency and minimizing dependence on manual labour. Government initiatives are accelerating infrastructure and digital adoption. Programs such as PM Gati Shakti and the Unified Logistics Interface Platform (ULIP) enable seamless multimodal coordination, faster customs clearance, and improved freight documentation. These initiatives are laying the foundation for smarter, leaner, and more resilient supply chains, critical for supporting India's rising global trade ambitions.

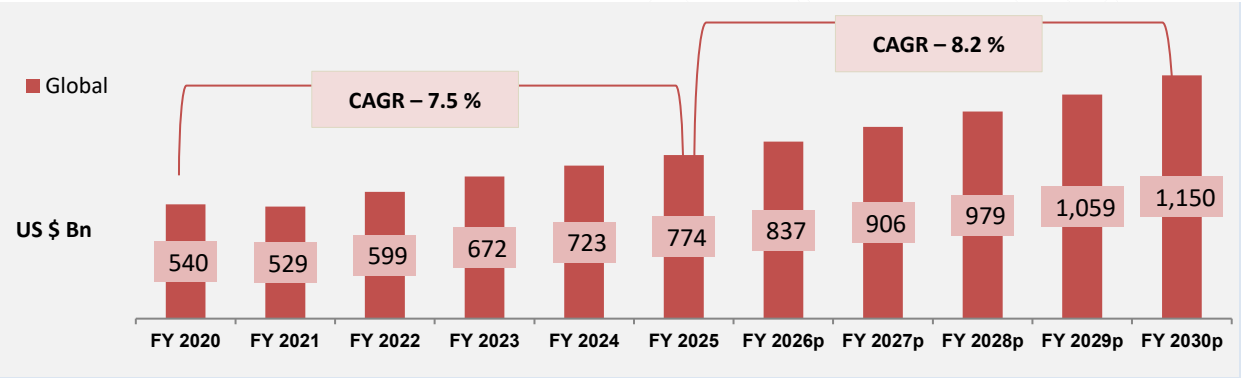
3.4 INDIAN WAREHOUSING MARKET SIZE

3.4.1 Indian warehousing market size

"Logistics improvements and government initiatives aim to enhance freight efficiency and support export growth. Despite strong warehousing market growth, India's storage capacity per capita remains low, highlighting the need for continued infrastructure development."

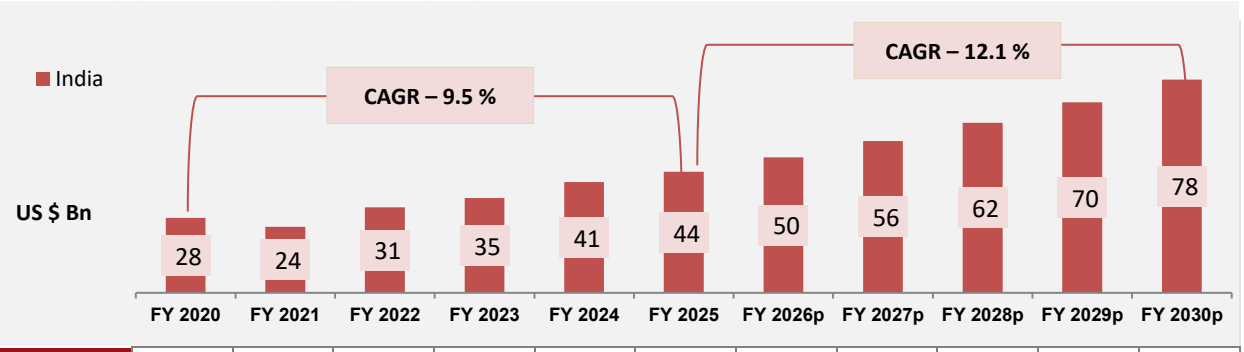
Based on Frost & Sullivan's estimates, the Indian warehousing market is anticipated to grow comparatively faster than the global warehousing market, recording a CAGR of about 9.5% during FY 2020–2025 and 12.18% during FY 2025–2030, driven by the robust growth of the manufacturing and e-commerce industries. In addition, several private investments and government initiatives like the Free Trade Warehousing Zones (FTWZs) provide global manufacturers with the necessary support. This has led to increased investments and the country becoming an attractive market to invest in for manufacturers backed with proper and suitable storage spaces. Figure 3.4 provides size of global warehouse market from FY 2020 to FY2030. Figure 3.5 provides size of warehouse market in India from FY 2020 to FY2030.

Figure 3.4: Warehouse Market Size (USD Billion), Global, FY2020 – FY2030p



***Source**: Frost & Sullivan Analysis*

Figure 3.5: Warehouse Market Size (USD Billion), India FY2020 – FY2030p



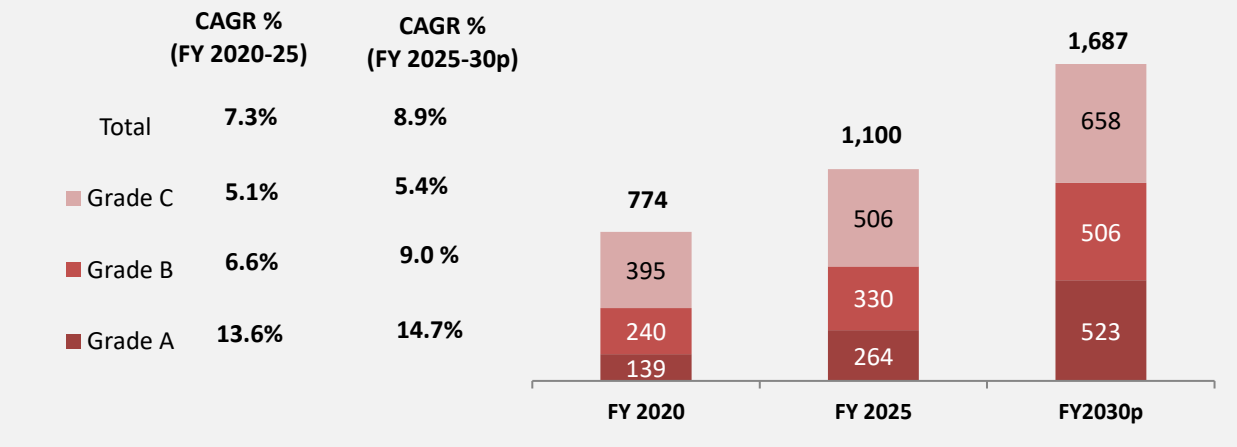
India Warehouse space (m sqft)	774	791	891	955	1,024	1,100	1,178	1,268	1,395	1,534	1,687
India per capita warehousing space (sqft.)	0.19	0.16	0.18	0.20	0.22	0.24	0.27	0.31	0.34	0.39	0.43

***Source**: The Associated Chambers of Commerce and Industry of India, Warehousing Development and Regulatory Authority and Frost & Sullivan Analysis*

India's per capita warehousing space remains low at just 0.24 sqft in FY 2025 - significantly below the U.S. (28.3 sqft), China (9.4 sqft) and U.K. (12.3 sqft) in CY 2024. To bridge this gap, the government is developing multimodal parks

and coastal economic zones, while granting infrastructure status to boost financing through cheaper external commercial borrowing for warehouse development. India's organized warehousing stock (Grade A and B) is estimated at approximately 594 million square feet for FY2025. Within this, the cold chain sector is evolving rapidly, with an estimated capacity of around 40 to 45 million tonnes, which corresponds to roughly 30 to 35 million square feet of dedicated temperature-controlled storage. In addition to cold storage, general purpose ambient warehousing supports sectors such as FMCG, retail, e-commerce, and manufacturing parts, reflecting the broadening requirements of India's expanding logistics market. The changing composition of warehouse infrastructure is detailed in Figure 3.6, which analyses the distribution of warehousing space by grade from FY2020 to FY2030.

Figure 3.6: Warehousing space (Million sqft) by Grade, India, FY 2020-30p



Source: *Transforming Logistics: Sustainable Solutions for India's Warehousing and Supply Chain, The Associated Chambers of Commerce and Industry of India (ASSOCHAM) and Frost & Sullivan Analysis*

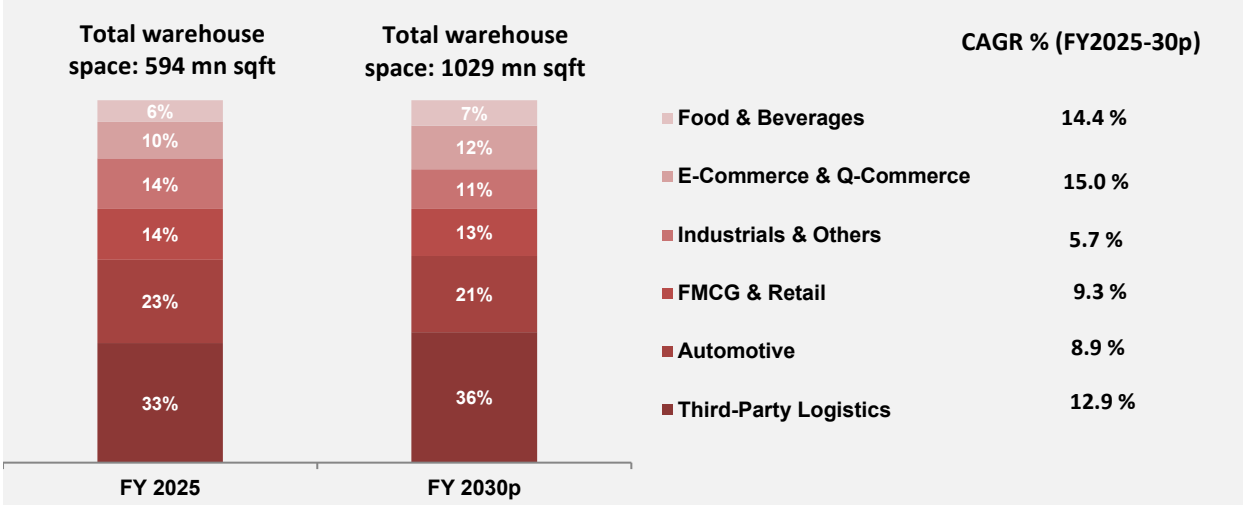
India's huge scope for improvement and added efforts by the private and public sectors have resulted in the growth of warehousing in the country. With sectors like 3PL and e-commerce growing significantly, warehousing trends are shifting towards more mechanized and automated operations. Occupying most of the warehouse space in India (>60%), these two sectors have raised the need for optimization and better warehousing development. This has resulted in a transition, from occupying larger warehouse space into facilities that boost value-added services of packaging, inventory management, product retrieval etc. Such a transition has been made possible with advanced technology forming the foundation of operations being run in the warehouses. The need for efficiency in last-mile deliveries has pushed urban warehousing structures to accommodate functions of fulfilment centers, with on-demand warehousing solutions gaining traction in the Tier 1 cities in India.

"India's warehousing is rapidly shifting towards automation and value-added services, driven by 3PL and e-commerce growth. Grade A warehouse space rose from 139 million sqft to 264 million sqft between (2020-2025), with technologies like IoT and robotics enhancing efficiency and traceability. Palletization is becoming crucial to support these automated operations."

The Third-Party Logistics (3PL) sector holds the largest share of organized warehouse space in India, accounting for 33% in FY2025 and projected to rise to 36% by FY2030. This growth is driven by increasing outsourcing post-GST, coupled with rising FDI inflows and policy reforms that are boosting demand from sectors like agriculture and manufacturing. The Automotive sector follows as the second-largest occupant, with a 23% share in FY2025, expected to hold a strong 21% in FY2030, supported by expanding production and distribution of parts. E-Commerce and Q-Commerce account for 10% of warehousing space in FY2025, projected to increase slightly to 12% by FY2030, though demand remains strong (15% CAGR) due to rapid growth in last-mile and express delivery models.

Figure 3.7 shows the shift in organized warehouse space occupancy across key end-use sectors in India from FY2025 to FY2030.

Figure 3.7: End User Split by occupancy of Organized Warehouse space, India, FY 2025-30p



Source: *Warehousing Development and Regulatory Authority (WDRA), India Brand Equity Foundation, The Associated Chambers of Commerce and Industry of India (ASSOCHAM) and Frost & Sullivan Analysis*

With e-commerce and quick-commerce sectors rising rapidly, Grade A warehouses have become the gold standard, offering advanced features to meet demanding fulfilment needs. These modern facilities, featuring high ceilings, heavy floor loading capacity, and column-free designs maximize storage density and operational efficiency. For quick-commerce players, strategically located urban dark stores with automated picking systems enable lightning-fast 10–30-minute deliveries in major cities. Larger e-commerce fulfilment centers incorporate sophisticated warehouse management systems, automated sorting technologies, and dedicated zones for returns processing. Many now include value-added services like kitting, labelling, and quality checks. Their strategic locations near urban consumption centers and major transportation arteries help balance speed and cost in last-mile delivery networks. By comparison, urban Tier 1 cities in China like Beijing, Shanghai, and Shenzhen achieve delivery times of 10 to 20 minutes for fresh produce and daily essentials, with many providers offering guaranteed 30-minute delivery slots. The decreasing turnaround times highlight the increasing importance of mechanization and palletization in warehousing to meet growing demand for speed and efficiency, particularly in quick commerce and food and beverage segments.

3.4.2. Growth Drivers

The Indian warehousing and supply chain industry is undergoing rapid transformation with technology adoption to infrastructure development. Several factors are reshaping the landscape and accelerating modernization. The need for warehousing by various sectors and third-party logistics (3PL) players has increased the demand for better quality warehousing in addition to growth in trade, manufacturing, and domestic consumption, pushing the need for the warehousing sector. Trade growth is predicted to raise and exponentially increase overall warehouse growth.

Large-scale, modern warehouses are being developed nationwide, particularly near major consumption hubs and transport corridors, as investors capitalize on higher yields (8-10%) compared to traditional real estate assets. This growth is fuelled by multiple factors: government policies like infrastructure status for warehousing and the National Logistics Policy, GST-driven formalization of supply chains, and India's booming domestic consumption. The sector's predictable cash flows from long-term leases with creditworthy tenants make it particularly attractive to institutional capital. Global institutional investors, including Blackstone, Brookfield, Everstone, Indospace and ESR, have heavily allocated capital to Grade A warehousing assets, driven by with more profitable rental yields (compared to 5–6% for office spaces) in major logistics hubs like Mumbai, Delhi-NCR, and Bengaluru.

The rapid growth of warehousing and dark stores in India is being primarily driven by the expansion of e-commerce and emergence of quick commerce platforms. E-commerce giants are demanding larger, strategically located warehouses to enable faster deliveries across the country. The quick commerce revolution, with its promise of 10–30-minute deliveries, has particularly accelerated the need for dark stores - small, urban fulfilment centers that act as hyper-local inventory hubs. Figure 3.8 provides top growth drivers for the warehousing and supply chain sector in FY 2025.

Figure 3.8: Top Growth Drivers Reshaping India's Warehousing and Supply Chain Sector, FY 2025

Grade A Warehousing & Vertical Stacking Expansion	With increasing regulatory compliance, higher throughput requirements, and a growing focus on operational efficiency, companies are investing in Grade A warehouses that offer better safety, durability, and automation compatibility. Vertical stacking is becoming essential due to rising land costs and space scarcity in urban and peri-urban locations, enabling better space utilization and higher storage density.
Automation & Digitization of Supply Chains	As supply chains grow more complex, businesses are rapidly adopting warehouse automation systems such as Warehouse Management Systems (WMS), robotics, RFID, and IoT-based asset tracking. These tools enhance inventory visibility, reduce human error, and allow scalable and efficient operations, especially critical for omnichannel logistics and high-turnover sectors.
E-commerce & Q-commerce Growth in Tier 2/3 Cities	The rapid rise of digital commerce beyond metro cities is driving the decentralization of supply chains. To meet faster delivery expectations, companies are setting up smaller fulfilment and distribution centers closer to demand centers in Tier 2 and Tier 3 cities, increasing the need for flexible warehousing infrastructure and asset pooling.
Rising Cold Storage Demand for Processed & Frozen Food	Rising urban consumption of dairy, meat, seafood, and ready-to-eat foods is pushing demand for cold chain infrastructure. Temperature-controlled warehousing is gaining momentum to ensure quality preservation and regulatory compliance, particularly in processed and frozen food categories.
Tech driven inventory optimization	Companies are leveraging AI, IoT, and analytics to enhance inventory visibility, accuracy, and responsiveness. These tools enable predictive demand planning, real-time tracking, and automated stock control, reducing stockouts, excess inventory, and holding costs while improving service levels and supply chain agility.
ESG-Focused Green Warehousing Investments	Corporates are aligning warehouse development with sustainability goals by adopting energy-efficient lighting, solar panels, rainwater harvesting, and green building certifications like IGBC and EDGE. These initiatives help reduce environmental impact, meet customer expectations, and unlock cost savings over the long term.
Shift Toward Integrated Logistics Outsourcing	Companies are increasingly outsourcing their end-to-end logistics functions—including storage, handling, and distribution—to organized third-party logistics (3PL) providers. This allows firms to convert fixed costs into variable costs, improve service levels, and focus on core operations, while 3PLs bring in expertise and scalability.
Government Push via Infrastructure Initiatives & Dedicated Freight Corridors	National-level programs such as PM Gati Shakti, Bharatmala, and Dedicated Freight Corridors (DFCs) are improving multimodal connectivity and lowering transit times. These reforms are unlocking new warehousing hubs along major corridors and enabling faster, more cost-efficient movement of goods.
Expansion of 3PL-Driven Warehousing Infrastructure	Growing reliance on third-party logistics (3PL) providers is increasing demand for modern, tech-enabled warehouses. As companies outsource logistics, 3PLs are investing in scalable storage, automation, and temperature-controlled facilities to manage diverse inventories, enhance visibility, and ensure efficient, timely deliveries.
Warehousing as a Strategic Supply Chain Node	A combination of rising demand, government-led infrastructure initiatives like PM Gati Shakti, and the need for tech-enabled operations is transforming warehousing into a critical supply chain function. Developers are building specialized facilities with automation, temperature control, and advanced inventory systems to serve diverse needs—from perishables to oversized goods

Source: *Frost & Sullivan Analysis*

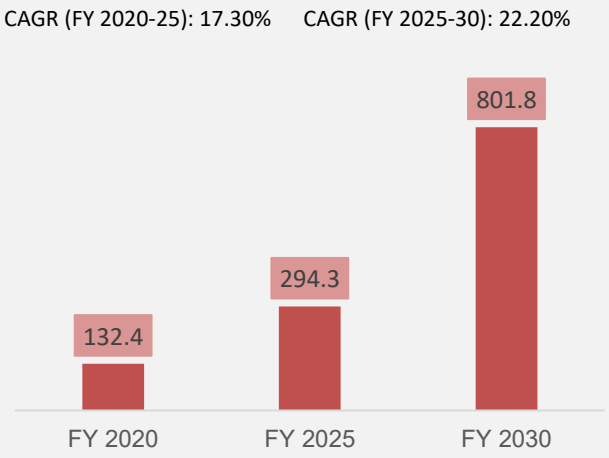
3.5 MODERNIZATION/AUTOMATION IN SUPPLY CHAIN

The transportation infrastructure sector is undergoing rapid transformation, driven by evolving client expectations, progressive policy frameworks, technological disruption, and the rise of integrated service providers. Clients today demand seamless, just-in-time deliveries, real-time visibility, and end-to-end reliability. This shift, heavily influenced by the standards set by B2C e-commerce, has redefined expectations even in B2B contexts. As a result, service providers are being compelled to adopt predictive analytics, digital dashboards, and demand-driven inventory management models that can adapt to fluctuating order volumes and service levels.

"The modernization of logistics and infrastructure is laying the foundation for a more agile, efficient, and resilient supply chain driven by smart technologies, integrated networks, and a policy environment that prioritizes connectivity and speed."

Trends in Indian warehousing are also expected to be shaped by the demand for modern warehouses with automated systems running on digital technologies, like robotics, Internet of Things (IoT), radio frequency identification (RFID), blockchain etc. Modern warehouses integrate these diverse technologies to make warehouse operations convenient and efficient. Inefficiencies are expected to be eliminated to a great extent with automated systems like conveyor/sortation systems and storage & retrieval systems allowing quicker turnaround times with faster transportation and better throughput with optimized usage of warehouse space. Figure 3.9 provides warehouse automation size and level of automation in India for the period FY 2025 and FY 2030.

Figure 3.9: Warehouse Automation Market Size (in USD Million), India, FY 2025 and FY2030p



Technologies	Share in 2025 (%)
Conveyor/Sortation systems	33.2 %
Automated Storage and Retrieval System (AS/RS)	26.2 %
Mobile Robots	18.6 %
Warehouse Management systems (WMS)	13.4 %
Automatic Identification and Data Capture (AIDC)	8.6 %

Source: *Frost & Sullivan Analysis*

Private firms are incorporating warehouse management systems, automatic identification and data capture, conveyor & sortation systems, automated storage, and retrieval systems, and mobile robots for enhancing capacity and operations to meet the demand for a higher amount of throughput. This is propelling the shift towards organized warehousing and automation in India. As customer demand for faster deliveries and traceability increases, technologies like IoT and RFID will assist in tracking and tracing of goods, thereby giving better transparency in the supply chain. With India's warehousing moving towards automation, there will be a dire need for pallets to provide a flat base for use on various automation systems. A standardization of unit load through palletization of goods is expected to rise with these automation and robotics systems installed across multiple warehouses in India since pallets enable automated warehouse operations.

4 PALLET AND PALLET POOLING MARKET ANALYSIS

4.1 PALLETS

4.1.1 Introduction To Pallets

"Pallets have become essential to modern supply chains, driving automation, space efficiency, and smooth goods movement, especially across sectors like FMCG, e-commerce, and manufacturing, backed by sustainability goals and advanced warehousing."

Pallets are flat transport structures that support goods in a stable manner during handling by forklifts, pallet jacks, or conveyors. They facilitate efficient storage, handling, and transportation by enabling unit loads, which allow multiple goods to be stacked and moved together, improving productivity and reducing damage. Pallets are a critical element of modern supply chains, enabling companies to operate more efficiently, reduce costs, and deliver products reliably and safely. Vertical stacking with pallets maximizes space in warehouses, factories, and containers. Pallets were traditionally regarded merely supportive tools, but they now are indispensable elements of any supply chain, optimizing automation, sustainability, and the efficiency of operations. Intermodal transport and system integration is facilitated by standardized sizes, and circular supply chains by reusable and connected pallets. The palletization process enhances safety, reduces labor requirements and associated costs, accelerates workflows, and enables real-time tracking of sensitive items. Pallets are widely used across production sites, warehouses, and industrial facilities, forming the base unit load post-production or procurement. Once packed, goods are placed on pallets, wrapped for safety, and moved through transport or storage networks. Pallets continue to streamline handling across distribution stages. Some are single use, but many are reused for cost-effective movement. The widespread use of pallets has enabled companies to optimize their supply chains, resulting in significant reductions in labor costs, product damage, storage and transit times. This high adoption rate is a key factor behind the relatively low logistics costs observed in these regions

Automation has increased with the uses of conveyors, robotic pickers, and vertical storage palletization which is increasing at a faster rate. In a bid to enhance efficiency and overcome space limitations, companies are investing in Grade A warehouses, high-bay racking, and real-time inventory systems. Intermodal hubs and the use of containerized freight systems also make it possible to move pallets with reduced labor requirements, while minimizing damage and increasing throughput.

4.1.2 Pallets By Material

Pallets range from wooden, plastic, metal and cardboard to other recycled materials. The most common type of pallets are wooden pallets which dominate the market with the maximum share, followed by plastic pallets. Plastic pallets have seen limited success in India due to higher costs compared to wooden pallets, and limited suitability for local handling and repair practices with unsuccessful company trials for plastic pallets within the country. Other pallet types include metal and cardboard pallets.

Figure 4.1 presents a comparison between materials used for pallets across selected criteria.

Figure 4.1: Types of Pallets - Comparison

Criteria	Wooden Pallets	Plastic Pallets	Metal Pallets	Cardboard Pallets
				
Share of Global Market (%)	88%	6%	2%	4%
Cost Efficiency	Low cost ($12–$16 each); widely available and affordable	High cost ($50–$80 each), around 3–5x costlier than wood	Very high cost ($90–$140 each); used mainly for niche or industrial applications	Very low cost: single-use pallets designed for light loads
Repairability	Easily repairable with basic tools at low cost	Difficult and costly to repair; replaced entirely	Rarely requires repair due to high durability	Not repairable
Load Capacity	680–1400 kg; high strength for static and heavy loads	Up to ~680 kg; prone to deformation under excessive loads	Extremely high load-bearing capacity; suitable for heavy engineering and military use	Low load capacity; best for light, boxed goods
Racking Strength	High stiffness and structural integrity	Moderate stiffness; may deform under prolonged heavy loads	Very high rigidity and impact resistance	Low stiffness; unsuitable for racking systems
Design Flexibility	Easy customization of sizes and formats	Limited flexibility due to expensive mold requirements	Limited customization; primarily built for strength	Customizable for specific SKUs but restricted by load limitations
Export Readiness	Widely accepted for exports; ISPM 15 treated for pest control (heat treatment and labelling required)	Limited acceptance depending on regional regulations	Rarely used for exports due to weight and cost	Accepted for low-value, one-way international shipments
Environmental Impact	Biodegradable, eco-friendly, renewable, consume less energy during production, and are highly recyclable. Less than 3% end up in landfills. End-of-life wood can be converted into mulch, bedding, or fuel.	Non-biodegradable but recyclable. Production and recycling require high energy and raw materials, resulting in a higher carbon footprint.	Energy-intensive to manufacture but extremely long lifespan offsets footprint	Low emissions during production but short lifespan creates high waste when used at scale
Industry Suitability	Ideal for FMCG, automotive, general warehousing, and exports	Preferred in pharma, and hygiene-sensitive industries	Used in automotive, heavy engineering, military, and long-term static storage	Common in light retail, electronics, e-commerce, and single-trip packaging
Useful Life	High-quality material last up to 20-25 years.	Durable build lasts 7–10 years	Rust-resistant lasts 10–15 years.	Usually for one-time use, but can last a few months if handled carefully

Source: *Frost & Sullivan Analysis*

In wooden pallet manufacturing, both hardwood and softwood are used, particularly Spruce-Pine-Fir (SPF), which is preferred in India for its cost efficiency and ease of handling. Although softwood is largely imported due to limited domestic availability, making it more expensive than hardwood, its long lifespan of around 40 years ultimately makes it a cost-effective choice. Hardwood, sourced from deciduous trees such as eucalyptus, mango, or legally procured teak through licensed channels, offers higher density and strength, making it suitable for heavy-duty applications. In contrast, softwoods like pine and fir are lighter, easier to machine, and quicker to treat, making them better suited for high-volume pallet production. Figure 4.2 details key comparison between softwood and hardwood against specific criteria.

Figure 4.2: Hardwood vs Softwood Wooden Pallets

Criteria	Hardwood	Softwood (SPF)
Cost	Expensive	Cost-efficient
Strength	Very high	Moderate to high
Weight	Heavy	Light
Processing	Hard to cut, higher tool wear	Easy to cut and treat
Moisture Resistance	More porous, higher risk of contamination	Less porous, better resistance, lower risk of contamination
Repairability	Harder to repair	Easier to repair
Automation Fit	Less consistent dimensions	Uniform, ideal for automation
Load Capacity	Ideal for heavy loads	Suitable for everyday load handling
Design	Often 2-way entry	Commonly 4-way entry
Safety	Risk of splinters/nails	Safer with smooth surfaces

***Source**: Frost & Sullivan Analysis*

4.1.3 Benefits Of Palletization

- Increasing Supply Chain Efficiencies: The use of material handling equipment (MHEs) such as forklifts, stackers, and order pickers has become central to modern warehousing operations, especially with the rise of Grade A and B warehouses, where palletization enables faster, safer, and more efficient handling. For these machines to function efficiently, a standardized and sturdy unit load base is essential, making pallets a critical enabler of mechanized storage and transport. Palletization allows goods to be handled, lifted, moved, and stacked with precision and speed, reducing manual labor requirements and improving operational throughput.

    - Faster and Easier Handling: Palletization enables goods to be grouped into unit loads, allowing larger volumes to be moved together compared to handling individual cartons. This significantly reduces the number of trips required for loading and unloading delivery vehicles or shipping containers, resulting in faster turnaround times. At the same time, the use of pallets simplifies the movement of goods within warehouses, minimizing manual effort and operational hassle. When used in combination with material handling equipment such as forklifts and stackers, palletized goods can be transported more efficiently, safely, and with greater ease, enhancing both speed and convenience across the supply chain.

    - Moving from Horizontal to Vertical Warehousing: Urban and land-constrained warehouses are increasingly adopting vertical storage to maximize space. Palletization supports high bay racking and multi-level storage configurations by providing a stable and standardized load base. Mobile pallet racks further optimize space utilization by enabling dynamic adjustments, ensuring no storage space remains underused. These advances collectively boost warehouse capacity and operational efficiency. The flat surfaces of pallets allow vertical stacking on warehouse racks which optimizes the warehouse space. Thus, warehousing capacity increases, allowing maximum number of goods to be stored. The advent of mobile pallet racks further optimizes handling of palletized goods and space by offering mobility to racks ensuring all unused spaces are utilized. Therefore, the overall throughput of the warehouse increases with the seamless movement of goods on pallets.

    - Minimizing Product Loss: Palletization helps reduce overall product loss by ensuring goods are securely grouped, stabilized, and protected during storage and transit. This is particularly important for fragile, bulky, or high-value items, including perishables, which are more protected when stored in pallets as it lowers the risk of spoilage during absence of temperature control through storage and transport. Tightly secured palletized units deter pilferage and reduce tampering risk during long-haul movement or at high-traffic hubs. The uniform stacking also allows better visibility and monitoring across the supply chain. Altogether, palletization supports safer, more traceable, and loss-resistant logistics.

    - Enabling Automation and System Integration: Palletization is a key enabler of automation in warehouses and production lines. Standardized pallet sizes and sturdy load bases allow seamless movement on conveyors, integration with robotic pickers, and automated storage and retrieval systems (AS/RS). This supports high-speed operations, minimizes manual intervention, and enhances consistency across the supply chain. As

stacking, moving, loading and unloading becomes automated, it eradicates the probability of any human errors while manual handling of goods.

- Reduction of Costs through Palletization: Palletization reduces overall costs by minimizing manual handling, improving turnaround times (TAT), and allowing higher transport volumes per trip. Optimized warehousing through vertical stacking and reduced product losses further enhances cost savings, while mechanization lowers operational inefficiencies.

- Worker Safety: Palletized goods are handled by forklifts and stackers instead of being manually lifted, reducing workplace injuries caused by heavy or bulky items. This ensures safer operations, better ergonomics, and higher workforce productivity.

- Moving from Traditional Production Lines to Palletized Continuous Production Palletization allows transformation of continuous production, where goods are placed directly onto pallets for downstream processes. This shift from manual batch handling to continuous palletized workflows reduces idle time, improves operational flow, and supports just-in-time (JIT) manufacturing.

- Moving from Smaller Trucks to Larger Trucks: Standardized pallet loads maximize vehicle space utilization by enabling uniform stacking and optimized payload capacity. This reduces the need for smaller, fragmented shipments, lowering transportation costs and fuel consumption while improving logistics efficiency.

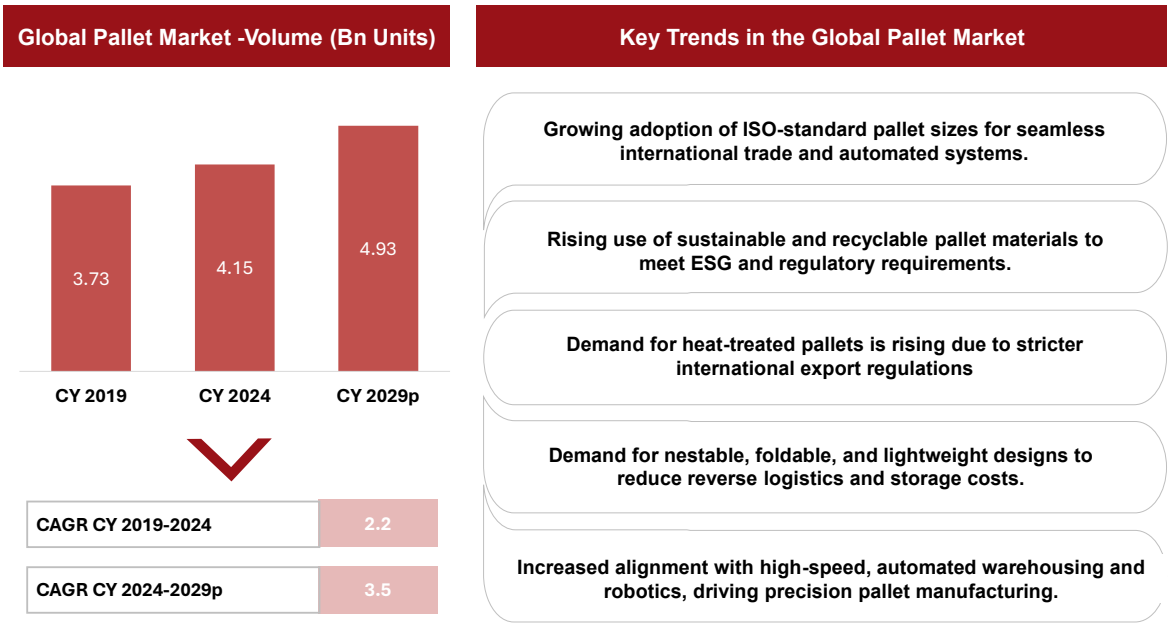
4.2 Global Palletization Market

As warehouses undergo rapid transformation through semi-automated and fully automated systems, palletization has emerged as a critical enabler of operational efficiency.

4.2.1 Market size and outlook

The global pallet production reached approximately 7.77 billion units in CY 2024, up from 6.92 billion units in CY 2019, growing at a CAGR of 2.4%. Figure 4.3 highlights global pallet circulation by volume, reflecting steady growth driven by increased industrial and retail demand.

Figure 4.3: Pallets Under Circulation by Volume (Billion Units), Global, CY 2019-29p



Source: *Frost & Sullivan Analysis* ***Note:*** *Includes wood, plastic, metal, cardboard, one-way pallets*

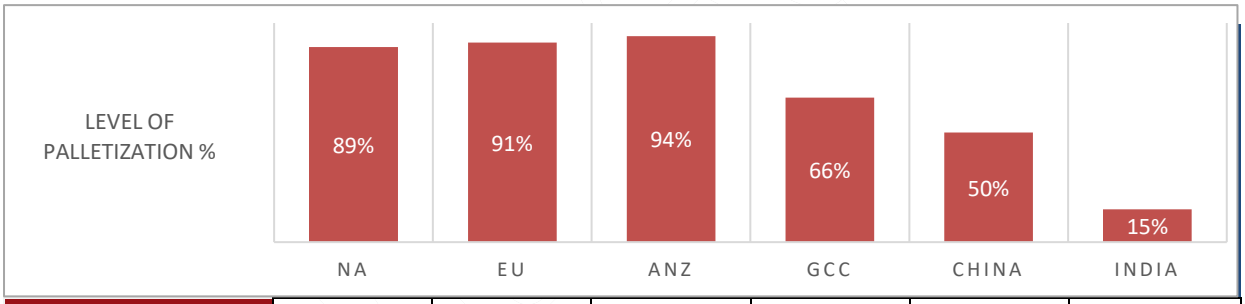
4.2.2 Level Of Penetration by Countries / Regions

Palletization adoption varies significantly across global markets, reflecting different stages of supply chain maturity. In developed economies like the North America and European Union, pallet usage approaches near-universal levels, supported by advanced logistics infrastructure and widespread automation. These markets benefit from established pallet pooling systems and standardized supply chain practices that maximize efficiency.

"While developed economies like NA/EU have around 90% palletization rates in CY 2024, emerging economies, especially India, shows a very high growth potential with only 15% palletization in CY 2024."

Developed economies maintain steady demand, but future growth is expected to be driven by emerging markets, particularly in the Asia Pacific region. As palletization is still at a nascent stage in APAC, the region's low current penetration presents a significant growth opportunity. With rising industrialization, expanding organized retail, and increasing supply chain standardization, APAC is expected to rise as a key contributor to the next phase of growth in the demand for pallets. This growth potential through rapid industrialization can be particularly observed in China and India - which are expected to record GDP growth rates of 5.5% and 9.5% respectively from CY 2024-2029p. This economic expansion, coupled with booming manufacturing, construction, and trade sectors, is creating significant opportunities for pallet adoption in these markets. China leads among developing nations with about 50% palletization, in CY 2024, driven by rapid industrialization and e-commerce expansion, though traditional sectors still rely on manual handling. India shows promising growth but remains at just 15% penetration in CY 2024, constrained by infrastructure gaps despite increasing logistics modernization efforts. The GCC region represents a unique transitional market where new, automated warehouses are adopting palletized systems at pace, while older facilities maintain manual processes. GCC is a highly industrialized and commercialized market and features a high level of palletization, standardized logistics practices, and a well-established movement hire model. Figure 4.4 captures the level of palletization by country with level of automation expected to raise palletization penetration.

Figure 4.4: Level of Palletization, by Country, CY 2024



	NA	EU	ANZ	GCC	CHINA	INDIA
Volume (Million units)	**1092**	**1,500**	**40**	**76**	**850**	**100**
Per capita palletization	**2.9**	**3.4**	**1.3**	**1.2**	**0.6**	**0.1**
Logistics Cost as a % of GDP	**8.0**	**8.0**	**8.5**	**10.0**	**14.0**	**14.0**
Level of Automation	High	High	High	Medium	Medium	Low
GDP PPP $ Tn India Multiplier	*37.1* *(2.3x)*	*27.1* *(1.7x)*	*1.3* (0.1x)	*4.8* *(0.3x)*	*38.7* *(2.4x)*	*16.2* *(1.0x)*
Pallet Million / GDP PPP Tr India Multiplier	*29.4* *(4.8x)*	*55.4* *(8.9x)*	*30.8* *(5.0x)*	*22.9* *(3.7x)*	*22.0* *(3.5x)*	*6.2* *(1.0x)*

Source: *Frost and Sullivan Analysis* ***Note:*** *India numbers refer to the financial year 2025*
Note: Level of automation – High: (≥50% of global standards), Medium: (25–50% of global standards), Low: (< 25% of global standards)

4.2.3 Growth Drivers

Figure 4.5 outlines key global drivers accelerating palletization, including automation, standardization, and rising trade volumes.

Figure 4.5: Growth drivers for palletization (Global)

Rising Industrial Output	Rising output from the industrial sector is expected to increase the use of pallets for industrial goods. Emerging opportunities in growing markets are anticipated to drive the need for pallets. Key market players and Asian countries like Japan, India, China, and the GCC are heavily investing in the manufacturing sector, which is driving the demand for advanced and more efficient logistics services. These investments and the resulting growth in manufacturing output have escalated the need for modern pallet systems to manage the increased movement of commodities with greater efficiency.
Time Sensitivity of Logistics and Supply Chain	Increasing demand for faster and more reliable deliveries has raised the importance of time-sensitive logistics. Palletization enables quicker loading and unloading, supporting just-in-time delivery and enhancing overall supply chain responsiveness.
Growth of Digital Commerce	The rise of digital commerce is significantly increasing retail sales, which in turn necessitates the use of pallets for efficient product transportation. As e-commerce gains momentum alongside the widespread adoption of smartphones and internet connectivity, the demand for logistics services has grown considerably. This trend has directly contributed to the global expansion of the pallet market.
Urbanization and Vertical Warehousing	In countries like India, urban space constraints have driven a surge in vertical warehousing development, particularly in Grade A facilities that emphasize modern standards and automation. This trend demands highly organized, space-efficient logistics systems, where pallets play a critical role. Pallets help optimize vertical storage, streamline handling through automated systems, and facilitate the safe and efficient movement of goods in multi-level buildings. Additionally, rising ESG goals among customers are encouraging the adoption of sustainable pallet solutions within these warehouses. Together, these factors make pallets indispensable to high-density urban logistics.
Initiatives by Industry Leaders	Key market players are undertaking significant initiatives to standardize and promote pallet usage across industries. Their efforts include offering returnable pallet programs, driving sustainable pallet manufacturing practices, and collaborating with logistics firms to optimize pallet circulation. Such initiatives are fostering a structured palletization ecosystem, which is crucial for scalable, cost-effective supply chain management.
Industry Leader Initiatives Rise of Automation	Key players are promoting pallet standardization, returnable pallet programs, and sustainable manufacturing practices. Simultaneously, the rise of automation in warehousing and logistics is accelerating demand for pallet systems compatible with robotic handling, ASRS, and smart inventory management—supporting scalable and efficient supply chains.

Source: *Frost & Sullivan Analysis*

4.3 Indian Palletization Market

Pallet penetration in India is rising as supply chains become more automated and integrated with modern warehousing and material handling systems. India's pallet industry is relatively young, gaining momentum and structure over the past 15 years. With growing industrialization and manufacturing capacity, pallet usage is expanding rapidly to support efficient storage, transport, and movement of goods. India's logistics sector is characterized

"India's pallet market is projected to grow from 100 million units in FY2025 to 150 million by FY2030 at an 8.4% CAGR, driven by logistics infrastructure development, automation, and rising manufacturing."

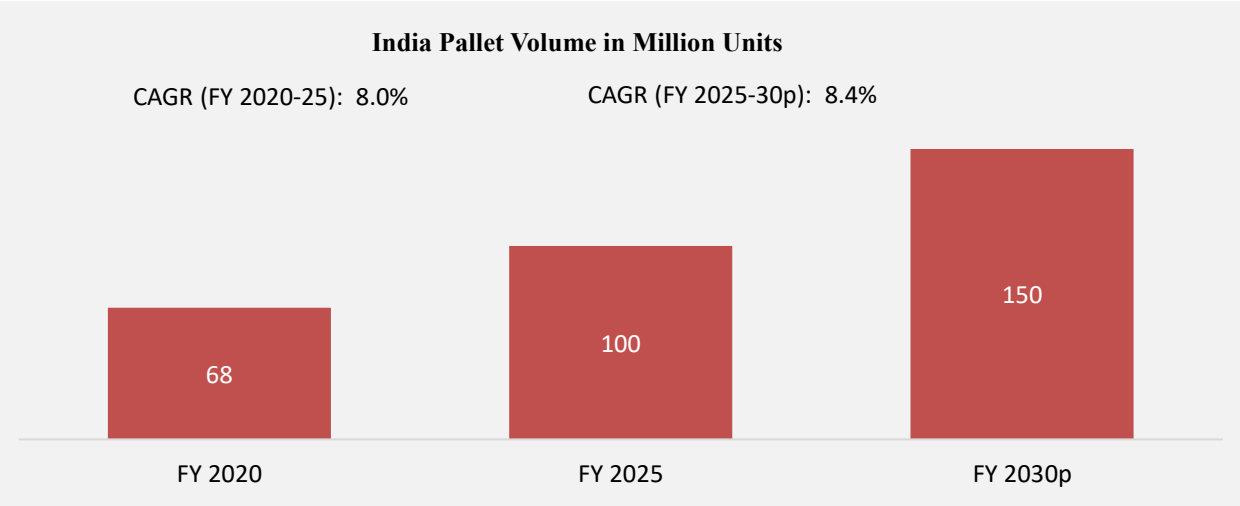
by low productivity, largely due to fragmented supply chains, manual handling and inefficient transportation systems, leading to high costs.

These challenges are prompting companies in India to seek modern solutions, with supply chain automation becoming increasingly attractive and palletization emerging as a strong element in this transformation. Further, an increase in population drives higher consumption, which in turn elevates demand and necessitates greater production. This growing need compels companies to adopt vertical expansion strategies, such as transitioning to Grade A facilities. The adoption of palletization is still at a nascent stage in India. As more companies in India recognize the benefits of palletization, the market is expected to grow rapidly, attracting both domestic and international players and driving further innovation in logistics and supply chain management. Within palletization, pallet pooling is also under-penetrated. Industries such as textiles, paints, solar energy, pharmaceuticals, chemicals, and heavy engineering are rapidly evolving and increasingly adopting palletization in India.

4.3.1 Market Size and Outlook

As industrialization and manufacturing capabilities of the country expand and increase the demand for efficient supply chain operations, the pallet market in India is expected to grow significantly. Figure 4.6 shows the growth in India's pallet market by volume from FY 2020 to FY 2030.

Figure 4.6: Pallets Under Circulation by Volume (Million), India FY 2020-30p



Source: *Frost & Sullivan Analysis* ***Note:*** *Includes wood, plastic, metal, cardboard, one-way pallets*

India's pallet market grew from 68 million units in FY 2020 to 100 million units in FY 2025, driven by rising industrial output and the need for standardized material handling in modern warehouses. The rapid adoption of automated storage, retrieval systems, and conveyor-based operations is creating steady demand for high-quality pallets to support increased warehouse throughput. With expected growth to 150 million units by FY 2030 (CAGR 8.4%), volume gains are primarily driven by e-commerce fulfilment centers, cold-chain logistics, and scaling manufacturing bases. India's young population and rising consumer aspirations are contributing to steady growth in domestic consumption. As production volumes rise based on increased demand, there is a greater requirement for pallets to store and transport goods. Concurrently, warehouse rental rates are increasing, encouraging grade B and C warehouses to consolidate and utilize vertical storage space more efficiently to optimize costs. This is likely to support broader adoption of standardized, quality pallets. The continued expansion of online shopping and the increasing expectation for rapid delivery highlight the need for ongoing supply chain modernization. Enhancing supply chain efficiency will help facilitate faster product movement and more reliable delivery to customers. The effective use and management of pallets and pooling assets are key components in supporting this modernization and ensuring a responsive supply chain.

4.3.2 Growth Drivers

The Indian pallet market is experiencing rapid growth driven by multiple factors spanning infrastructure development, technological advancements, evolving end-user requirements, and increasing sustainability priorities. These key

drivers are shaping the future of palletization across industries, enabling more efficient and environmentally responsible supply chains.

Figure 4.7 showcases Growth drivers for Palletization in India.

Figure 4.7: Growth drivers for palletization (India)

Grade A Warehousing and Vertical Stacking	- Surge in demand for high-specification Grade A warehouses and vertical storage systems, with a significant share of new Grade A facilities already fully palletized, driven by the need for optimized warehouse space and standardized goods movement. - Development of multi-modal logistics parks and mechanized warehouses supporting efficient handling and storage. - Uniform pallet sizes and quality needed for racking and vertical stacking. - Rising land costs in urban areas are pushing adoption of vertical warehousing formats, supported by mechanized systems that reduce manual labor and enhance handling efficiency.
Automation of Supply Chains	- Rapid adoption of robotics, conveyor systems, automated guided vehicles (AGVs), and automated storage and retrieval systems (ASRS) in warehouses, especially in metro and tier-1 cities raising the demand for automation-compatible pallets. - Companies are investing in pallets designed for seamless integration with automated systems to exact specifications to support high-speed operations and reduce manual handling, making them essential for logistics providers embracing Industry 4.0. - Growth of e-commerce and q-commerce requiring automated fulfilment centers and palletized logistics for high-volume, fast dispatch (including 1–2-hour delivery windows). - Digital tracking technologies (RFID, IoT sensors, QR codes) are increasingly deployed to improve real-time visibility, reduce asset loss, and optimize supply chain efficiency.
Growth of End-User Sectors	- Strong expansion in FMCG, Food and Beverage, automotive, industrials, and others, with these sectors rapidly adopting palletization to enhance handling efficiency and meet the needs of modern, automated logistics networks. - Diversification and rapid growth in cold chain logistics to handle perishables like dairy, meat, and pharmaceuticals, necessitating robust pallets to maintain product integrity. - Increased consumer spending due to rising per capita income boosting organized retail and supply chain activity. - Rising manufacturing exports supported by initiatives like 'Make in India' and the National Manufacturing Mission, driving higher pallet demand for export logistics.
Rising ESG Goals of Customers	- Growing focus on sustainability influencing pallet design and materials, with manufacturers exploring recyclable and responsibly sourced inputs. - Corporate ESG commitments and evolving government regulations on plastic waste and circular economy goals accelerating adoption of eco-friendly pallet solutions. - Sustainability and operational efficiency converging to make customized, durable, and reusable pallets a priority.

Source: *Frost & Sullivan Analysis*

India's logistics sector faces high costs due to fragmented supply chains, manual handling, and inefficient transportation systems, driving companies to adopt modern solutions such as mechanization and automation. The expansion of Grade A warehousing and the shift toward vertical stacking are increasing demand for standardized, high-quality pallets that enable efficient space utilization and safe, compact storage. Growing automation in the supply chain further reinforces the need for uniform pallets and reusable containers, which ensure compatibility with automated systems, optimize efficiency, and reduce manual intervention. Additionally, the rapid growth of end-use markets—including FMCG, F&B, 3PL, e-commerce, quick commerce, automotive, and industrials—is accelerating the adoption of palletization to support scalable, reliable, and cost-efficient supply chain operations. Rising ESG commitments are also driving a shift toward sustainable practices, with pallet pooling reducing single-use packaging, minimizing waste, and promoting asset reuse. Together, palletization and pallet pooling enable companies to streamline operations, lower costs, enhance competitiveness, and achieve their sustainability objectives.

4.3.3 Growth By End-Use Sectors

"India's pallet market is transitioning from unorganized, fragmented players to organized, tech-driven solutions, driven by automation, e-commerce, and government reforms, with the organized segment expected to dominate as standardization and logistics modernization accelerate."

India's pallet industry is experiencing strong momentum, fuelled by digital transformation, automation, and sector-specific customization. Once basic load carriers, pallets have evolved into essential components of modern supply chains—enhancing efficiency, reducing handling time, and enabling higher safety and throughput across warehousing and transportation networks.

Pallet adoption varies significantly across sectors. While sectors like automotive, and industrial goods demonstrate high usage due to the nature of goods and need for safe, high-volume handling, others such as solar and general trade remain partially palletized due to packaging or infrastructure constraints. For example, solar cells are typically stored in trays or vacuum-sealed boxes, whereas PV modules and rooftop kits are highly palletized and wrapped for secure transport. Inverters, BOS components, and mounting structures range from medium to high palletization.

By industry, the six major end-use sectors shaping India's pallet demand are:

1. **Food & Beverage**: Demand is rising due to the growth in processed foods, agricultural exports, and cold chain requirements. The sector's emphasis on hygiene is driving adoption of food-grade pallet solutions.

2. **FMCG**: Growth is being driven by rural distribution expansion and increasing adoption of standardized pallets across organized supply chains.

3. **Automotive**: Specialized heavy-duty pallets are used for just-in-time manufacturing. Government initiatives like the PLI scheme and rising auto exports are further boosting demand for export-compliant pallet systems.

4. **E-Commerce & Quick Commerce**: The rapid expansion of fulfilment centres and dark stores in Tier 2/3 cities is driving demand for compact, lightweight pallet designs. Q-commerce's hyperlocal model is accelerating the need for specialized pallet solutions suitable for tight delivery windows and space-constrained environments.

5. **Third-Party Logistics (3PL)**: The formalization of India's logistics sector has made 3PLs major demand drivers. They prioritize durability and interoperability across diverse client needs, supported by the growth of omnichannel retail and contract logistics.

6. **Industrials & Others**: Sectors such as chemicals, textiles, and capital goods require customized pallets for heavy equipment and hazardous material handling. Increasing focus on warehouse automation and safety is pushing standardization in pallet usage.

Unlike developed markets where pallet usage is largely standardized, India's key sectors remain fragmented. However, ongoing reforms like GST implementation, infrastructure development, and logistics formalization are accelerating the shift toward organized and tech-enabled pallet ecosystems. Leading organized players are expanding their presence in sectors such as e-commerce, automotive, FMCG, and 3PL, driving the adoption of standardized, reusable, and trackable pallet systems across the country.

Figure 4.8 illustrates India's projected pallet volume by end-user segments between FY2020 and FY2030p, highlighting the growing role of these sectors in shaping the industry's evolution.

Figure 4.8: Pallet Use by End User Segments in India (Million Units), FY 2020-2030p

Industry	FY2020	FY2025	FY2030p	CAGR % (2020-2025p)	CAGR % (2025-2030p)
	Pallet Market by End Users (In Million)				
Food and Beverages	17.71	24.95	35.30	7.10	7.19
Ecom and Q Com	3.90	7.95	16.68	15.31	15.98
3PL	6.61	9.73	14.69	8.04	8.59
FMCG and Retail	18.36	27.32	41.10	8.27	8.51
Automotive	5.01	7.24	10.50	7.64	7.72
Industrials and Other sectors	6.44	9.14	13.00	7.25	7.30
Other Manufacturing	9.97	13.67	18.73	6.52	6.50
Total Pallet Market	68.00	100.00	150.00	8.02	8.45

Source: *Frost and Sullivan Analysis* **Note:** (1) Industrial & Other Sectors Include Machinery, Cement, Steel, Chemicals, Consumer Electronics, Paints and Coatings (2) Other Manufacturing -Textiles, Pharmaceuticals, Fabricated Metals, Rubber and Plastics

4.4 PALLET POOLING

4.4.1 Introduction To Pallet Pooling

"Pooling pallets offers greater advantages through scalability, cost-efficiency, and environmental benefits. Softwood pallets remain the preferred standard due to their low cost, reusability, and operational compatibility across organized, high-volume supply chains."

As pallet usage is increasing, it has created a market for pallet pooling by offering pallets as a service. Pallet pooling is a system where companies use pallets from a shared pool instead of owning their own. Companies can hire them from a pooling provider. This means they pay a fee to use pallets as needed, rather than investing in and maintaining their own pallet inventory. Pallet pooling is gaining traction as a cost-effective and efficient method to integrate palletization into supply chains. Under this model, companies outsource the ownership and management of pallets to third-party providers, effectively treating pallets as a service. This reduces the burden of procurement, maintenance, tracking, warehousing space requirements, manpower, and time, while ensuring consistent quality and availability across operations. As a result, pallet management is fully handled by specialists, streamlining operations for users. These services provide the flow of palletized goods in an economical and environmentally beneficial method with a shared economy model. Its advantages like lower costs and higher sustainability are anticipated to increase the usage of pallet pooling, allowing companies to focus their financial resources on core business investments rather than operational management.

4.4.2 Business Models for Pallet Pooling Services

Pallet pooling services can be categorized into two business models from the progression stages:

- **Static Hire Model**: A pooling arrangement where pallets are hired for use at a fixed location, typically a warehouse or distribution center. The pallets remain stationed at the site for ongoing operations rather than circulating through the supply chain. This model supports long-term, location-specific usage without integration into broader supply chain flows.

- **Movement Hire Model**: A fully networked ecosystem enabling multi-party pallet circulation across the complete value chain (raw material suppliers → end retailers). Features standardized asset sharing, automated tracking, and optimized reverse logistics for maximum pallet utilization.

Figure 4.9 compares Static Hire and Movement Hire pallet pooling models across six operational criteria: asset movement, responsibility, billing basis, use cases, return logistics, and profitability.

Figure 4.9: Static hire vs. Movement hire

Criteria	Static-Hire	Movement – Hire
Asset Movement	Pallets stay at one site (static location)	Pallets move through the supply chain to multiple users
Responsibility	Remains with the original customer	Transfers to the next party (e.g., receiver/customer)
Billing Basis	Based on pooling duration (daily/monthly)	Based on the transfer to a new user
Use Case	Internal operations, warehousing, seasonal overflow	Dynamic supply chains, multi-leg logistics
Returns	Pallets must be returned to the same location or de-hired for collection by the pooling provider	Next user in the system continue to hire or returns to pool

Source: *Frost & Sullivan Analysis*

4.4.3 Benefits Of Pallet Pooling

Pallet pooling delivers a range of operational and financial advantages that improve supply chain performance, especially for businesses with extensive distribution networks. Compared to traditional one-way pallets, reusable pooled pallets offer several key benefits. Built with high-quality materials for long-term durability, they can handle heavier static and dynamic loads and typically last for several years. Their uniform dimensions and specifications make them highly compatible with automated systems, racking, and vertical stacking, which enhances worker safety and maximizes warehouse space utilization. Unlike one-way pallets that often vary in size and are less accessible, pooled pallets allow equipment access from all sides, boosting handling efficiency. Over time, these reusable pooled pallets prove more cost-effective, with a lower total effective cost and a reduced carbon footprint due to their durability and circulation. The adoption of palletized storage and handling solutions delivers significant advantages, including accelerated loading and unloading processes, optimized commodity flow, enhanced safety for both goods and personnel, and improved inventory control. Furthermore, palletization facilitates superior monitoring of goods by standardizing volumetric measurement per unit, while enabling high-density storage through advanced racking and stacking methodologies. Managed by third-party providers, pallet pooling is gaining traction in markets like India, especially in high-throughput sectors where efficient pallet circulation can improve operational performance and lower supply chain costs.

- ✓ Asset-Light Operations and Cost Efficiency: Owning pallets requires significant capital investment in building infrastructure and purchasing assets. In addition, operating expenses (OpEx) of maintenance, repair and disposal add on to the Capital expenditures. Pallet pooling allows customers to remain asset-light by shifting from high upfront CapEx to more flexible OpEx, enabling them to channel funds toward their core business activities. Maintenance and repair are fully managed by the pooling providers, offering hassle-free operations for clients.

- ✓ Optimized Supply Chain Efficiency -Pallet pooling enhances supply chain performance by ensuring standardized pallet availability across all nodes. This supports faster turnaround times, consolidated load patterns, and higher throughput—especially in high-volume or TTS operations. Improved pallet compatibility across handling points also reduces warehouse and transport inefficiencies, contributing to overall cost savings.

- ✓ On demand Scalability and availability: One of the key advantages of pallet pooling is the flexibility it offers in adjusting pallet volumes based on business needs. During peak periods such as seasonal surges or

promotional campaigns, pooling providers ensure timely and just-in-time pallet delivery, enabling businesses to scale up quickly without delays or operational bottlenecks. Conversely, during off-peak or low-demand periods, companies can scale down without bearing the burden of unused inventory. This eliminates the need to purchase and store excess pallets in advance, improving warehouse utilization and reducing idle asset costs. By aligning pallet supply with real-time operational requirements, pooling helps businesses stay agile, efficient, and cost-effective across varying demand cycles.

- ✓ Hassle-Free Maintenance and Availability: Pooling providers manage the entire pallet lifecycle—including collection, repair, and redistribution, eliminating the need for asset maintenance. This reduces waiting times, ensures timely pallet availability, and enables businesses to focus on core operations while benefiting from professional upkeep and real-time tracking within the pallet network.

- ✓ Improved Safety and Handling: Pooled pallets are built to higher quality standards, offering greater durability and load stability. Their uniform design minimizes breakage and handling risks, improving safety for both workers and goods across storage, transit, and automated operations.

- ✓ Sustainability: Offering sustainability, pallet pooling provides reusable pallets and manages pallet flow in an economical and environmentally beneficial method. This ensures the circulation of reusable, repaired pallets. When pallets are rendered unusable, they are reduced to wood fiber for other uses. This multiple usage helps in reducing carbon footprint with reduced wood consumption, wastage as well as emissions. In addition, pallet pooling service providers optimize supply chain flow to prevent empty miles of reverse logistics which increases its sustainability.

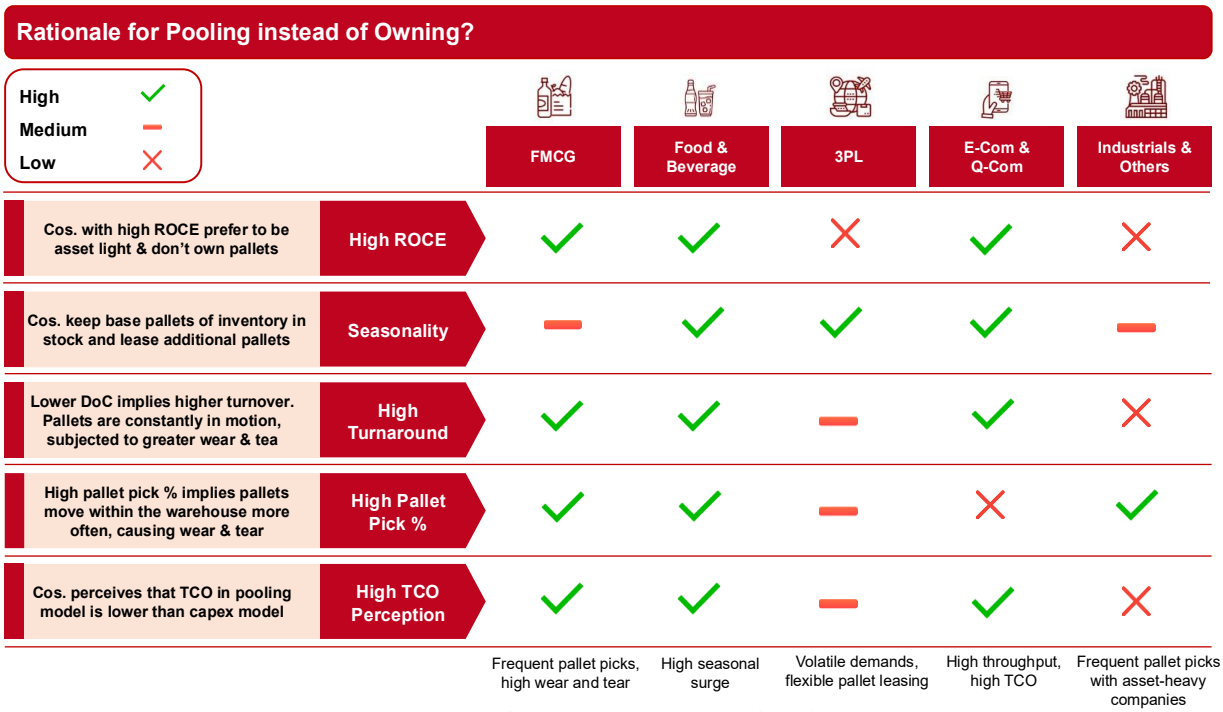
- ✓ Higher warehouse throughput: Another benefit to pooling services is better warehouse utilization as no additional space is required for storing unused pallets. Since pooling companies handle pallet storage, clients avoid clutter and free up valuable warehouse space for inventory and operations. This streamlined pallet management reduces congestion in loading and unloading areas, enabling smoother and quicker material flow. This helps improve warehouse efficiency and supports higher throughput without expanding facility size.

- ✓ Pallet pooling providing integrated value-added services: Value-added services like wrapping of palletized loads, labelling/tagging and transportation to warehouses are also being incorporated by companies to capture increasing demand of pallet pooling as well as other value-added services. Services like storage are also provided by pooling companies as value added services when the client falls short of storage space or requires certain manufactured merchandise to be stored at a separate location.

Advantages and Rationale for Pallet Pooling

Pallet pooling adoption varies by sector, driven by operational scale and supply chain dynamics. B2C sectors such as FMCG, food & beverage, e-commerce, and quick commerce show the highest pooling adoption due to rapid product turnover, high pallet pick rates, and the need for standardized, reusable solutions that support automation and sustainability goals. In contrast, asset-heavy B2B industries like automotive and industrial goods continue to rely more on owned pallets, given their specialized handling needs, irregular shipment cycles, and longer inventory lead times, which make pooling less cost-efficient. As India's supply chains evolve, pooling, specifically movement-hire models are gaining traction, especially in high-throughput sectors. Additionally, growing demand for supply chain transparency and the integration of tracking technology in pooled pallets are reinforcing this shift, positioning B2C sectors to lead innovation in pooling models. Figure 4.10 illustrates these growth catalysts for pallet pooling adoption in India, including cost savings, reduced product damage, and shifting operational models.

Figure 4.10: Rationale for Pooling instead of Owning



Source: Frost and Sullivan Analysis

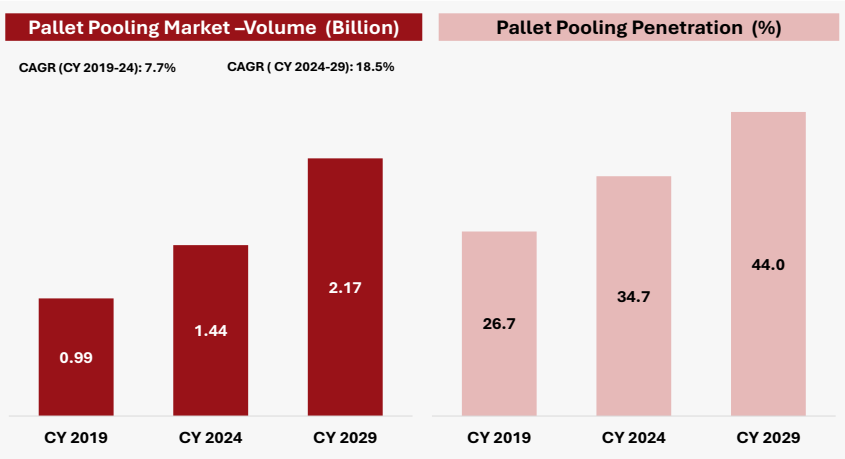
4.5 GLOBAL PALLET POOLING MARKET

The global pallet pooling market is witnessing steady growth driven by the increasing demand for cost-efficient, sustainable, and automation-compatible pallet solutions across industries.

4.5.1 Market Size and Outlook

The proportion of pooled pallets from total pallets under circulation is expected to increase from 34.7 % in CY 2024 to 44.0 % CY 2029p. Pooled pallets account for approximately 1.44 billion units in circulation in CY 2024, representing a significant portion of the total pallet volumes and is expected to reach 2.17 billion in CY 2029p. Figure 4.11 shows the penetration rate of pooled pallets as a percentage of total pallets in circulation globally from 2019 to 2029 (projected).Pooled pallets are expected to grow at a higher CAGR of 8.5%, compared to the historical growth of 7.7%, as pallets as a service grow in demand due to its convenience and cost efficiency. Standardization across supply chains is increasing, with pooled pallets becoming the preferred choice in high-throughput, organized sectors. At the same time, third-party pooling networks are expanding, enabling wider access and adoption in both developed and emerging markets. As a result, the share of pooled pallets in total circulation continues to grow, driven by businesses transitioning from single-use pallets to shared, reusable models. Higher penetration in organized and automated supply chains, with pooled pallets becoming a standard choice in sectors requiring uniform specifications.

Figure 4.11: Size of Pooled Pallets (Billion) and Pooled Pallets as a Proportion of Total Pallets (in %) under Circulation, Global, CY 2019-29p



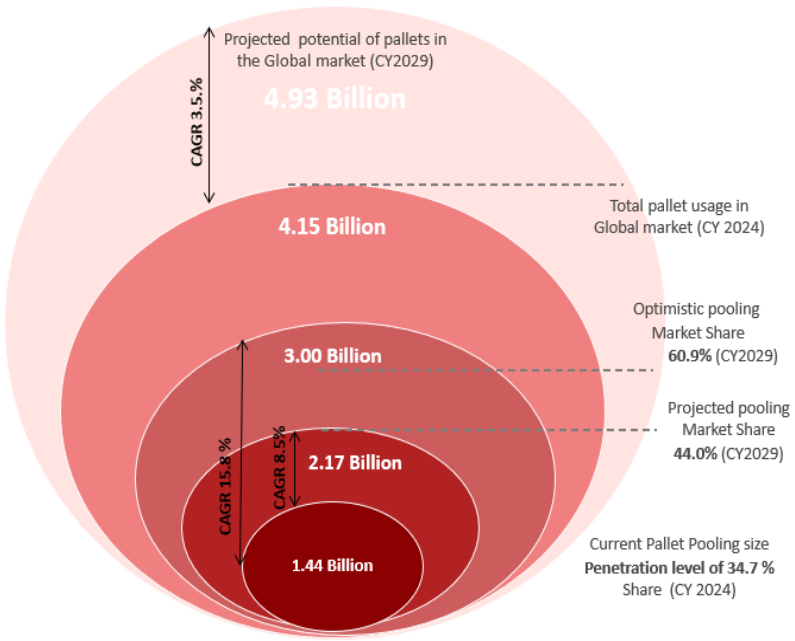
***Source**: Frost & Sullivan Analysis*

Estimation Of Opportunity

The global total addressable market for pallet pooling is projected to reach 2.17 billion pooled pallet units by CY 2029, while the 1.44 billion units shown above represent the pallet pooling market volume in CY 2024. Figure 4.12 projects the global pallet pooling Total Addressable Market (TAM) from CY2024 to CY2029, forecasting volume growth, penetration rates.

"Global palletization is driven by e-commerce, smart pallet tech, and manufacturing, with pooled pallets rising from 34.7% in 2024 to 44.0 % by 2029 (8.5% CAGR)"

Figure 4.12: Total Addressable Market – Pallet Pooling by Volume (Billion Units), Global, CY 2024-2029p



Scenario 1 - Conservative

On the basis of conservative projections, current pallet pooling is expected to increase at 8.5% CAGR to reach 2.17 billion pallets in CY 2029, with 44.0% penetration.

Scenario 2- Optimistic

Assuming a more optimistic 60.9% pooling penetration, the market is expected to increase at 15.8% CAGR to reach 3.0 billion pallets in CY 2029.

Source: Frost and Sullivan Analysis

Beyond the overall market size, understanding the operational models and pricing structures provides deeper insight into how the pallet pooling market functions. The pricing structure is typically split between static hire and movement hire models, depending on customer requirements and supply chain dynamics.

"Mature markets like North America, ANZ and EU dominate pallet pooling, while growth momentum is shifting to developing regions such as China, and India driven by digitalization, sustainability, and standardization efforts."

4.5.2 Level of Penetration by Countries / Regions

Mature markets continue to lead in terms of volume and infrastructure with developed regions making up the largest pallet pooling numbers. This has been enabled by a mature supply chain ecosystem, widespread standardization, and the presence of established pooling service providers. This high adoption rate is a key factor behind the relatively low logistics costs observed in these regions. The reduction of turnaround time (TAT) and supply chain costs are the ultimate aim of any supply chain model working in any country and palletization helps to achieve this. Figure 4.13 compares regional pallet and pallet pooling market sizes across key geographies for CY 2024.

Figure 4.13: Pallet and Pallet Pooling Market across key regions, CY 2024

Indicator	North America	European Union	China	GCC	India	ANZ
Total pallets under circulation (Million Units)	1092	1,500	850	76	100	40
Pooled Pallets (Million Units)	601	675	80	3.75	9	38
Level of palletization	89.0%	91.0	50.0%	66.0%	15.0%	94.0%
Pallet pooling penetration (%)	55.0%	45.0%	9.4%	4.9%	9.0 %	95.0%

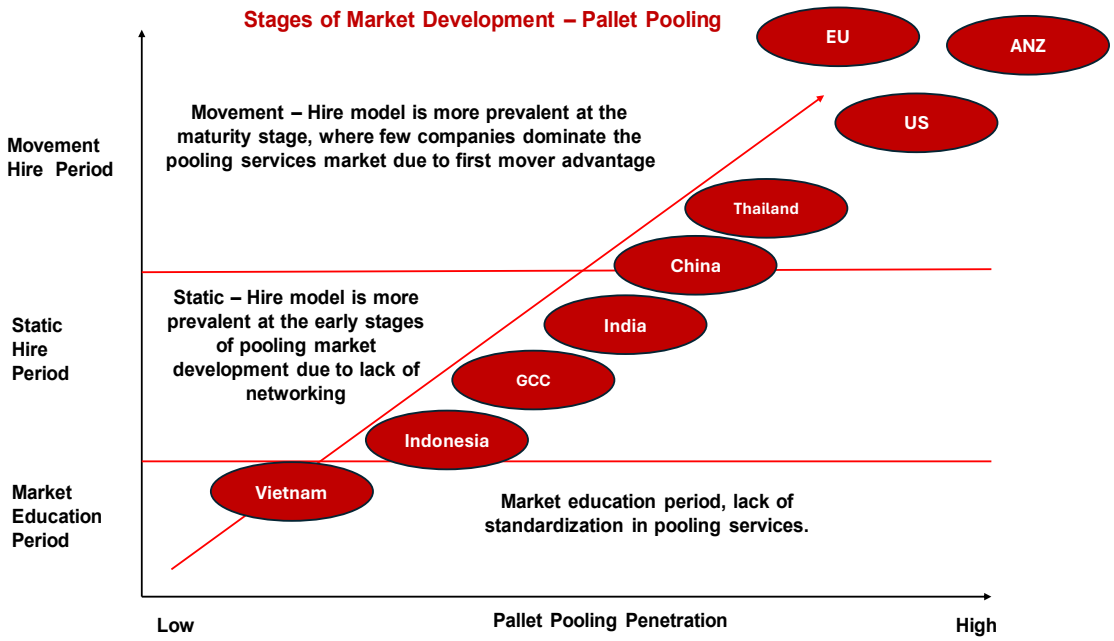
***Source**: Frost & Sullivan Analysis. Note: India numbers refer to the financial year 2025*

While mature markets remain ahead in pallet pooling volume and infrastructure, the real growth momentum is expected from developing nations that are now building the foundation for structured, large-scale palletization and pooling ecosystems. This growth will be fuelled by the increasing use of digital tools, a stronger focus on sustainable supply chain practices, and greater standardization of pallet systems. North America has a pallet pooling market of 1,092 million units, representing 55% penetration of its total pallet circulation. The EU follows with 1,500 million pooled units (45% penetration), supported by standardized Euro pallets and harmonized cross-border transport. In contrast, developing regions display varied adoption patterns. India remains one of the most underpenetrated markets at just 9 million pooled pallets (9% of its 100 million total pallets). China has made significant progress with 80 million pooled pallets (9.4% penetration of its 850 million total pallets) driven by government standardization efforts and investments in smart warehousing. Meanwhile, the GCC shows only 3.75 million pooled pallets (4.9% penetration of its 76 million total pallets), reflecting its still-nascent pooling ecosystem.

Market Maturity Analogues in Pallet Pooling

In mature markets like the North America and European Union, where labor costs are high, palletized transport is nearly universal. For a country like India, which faces high logistics costs and rising pollution, adopting pallet pooling systems offers significant efficiency and environmental benefits. Such a shift could reduce CO_2 emissions by approximately 2.5 million tonnes annually, driven by improved truck volume utilization and the reuse of pallets, as opposed to single-use pallet systems. The progression of pallet pooling markets follows a consistent global pattern, as evidenced by pooling penetration of mature markets like Germany, the UK and Australia. These markets contrast sharply with pooling penetration in developing economies like India and Thailand. Thailand's rapid evolution, driven by automotive and e-commerce automation, demonstrates how sectoral demand and cross-border integration can accelerate maturity. Thailand's pallet pooling market began as a fragmented, static-hire model but has matured significantly in recent years, driven by automation in e-commerce and manufacturing. For India, replicating this trajectory will require scaling manufacturing-linked pooling (as seen in Thailand's F&B sector) and transitioning from static to transfer-hire systems, mirroring the path of now-mature markets. LEAP's early dominance positions it similarly

to pioneers like CHEP around the globe, suggesting India's market could consolidate around such players as penetration grows.



Source: *Frost & Sullivan Analysis*

4.5.3 Growth Drivers

The global shift toward more sustainable, cost-efficient, and digitally enabled supply chain systems is accelerating the adoption of pallet pooling, especially in the developing nations. Figure 4.14 outlines the primary global growth drivers for pallet pooling adoption across industries.

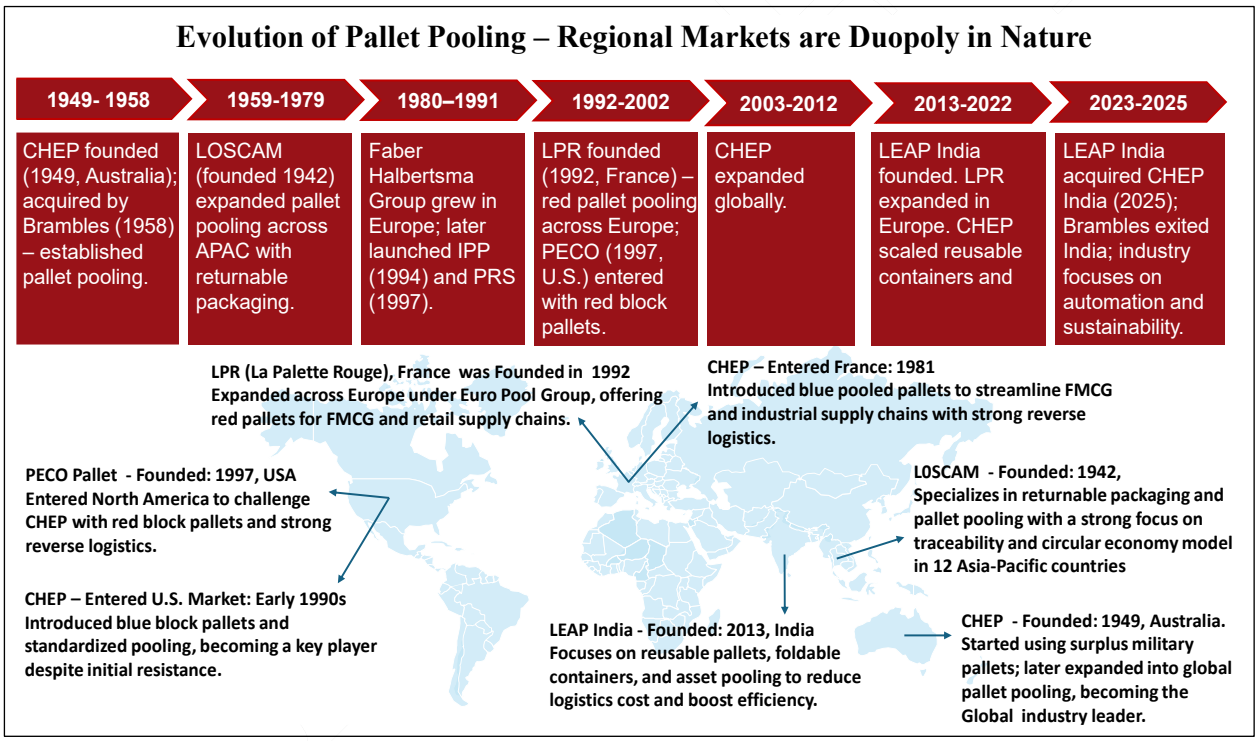
Figure 4.14: Growth drivers for pallet pooling services (Global)

Cost Reduction Pressure	The increasing demand from businesses to reduce supply chain costs while maintaining efficient supply chain operations is a primary factor driving the growth of the pallet pooling market. Pallet pooling enables companies to avoid the high capital expenditure associated with owning pallets, streamlining operations through shared resources.
Operational flexibility	Pooling model offers scalable, on-demand pallet availability, adapting quickly to fluctuating supply chain needs.
Pooling Network Expansion	Expansion of pallet pooling supplier networks has increased and is expected to continue increasing geographic coverage and service availability, making pooling solutions more accessible and reliable for a broader range of industries and regions, thus driving adoption.
Centralized Production Trends	Increasing centralization of production facilities is leading to longer-distance goods movement, raising the need for pallet pooling to efficiently manage pallet circulation and avoid costly reverse logistics.
Ease of repair and maintenance supporting core business	Pallet pooling allows companies to outsource pallet ownership, repair, and maintenance to specialists, freeing internal resources to concentrate on core business activities.
Sustainability and Environmental Initiatives	The rising emphasis on sustainable supply chains is boosting the adoption of pallet pooling services. Pooling contributes to environmental goals by optimizing transportation routes, eliminating empty miles, and promoting pallets made from responsibly sourced or recyclable materials. As companies pursue ESG commitments and circular economy principles, pallet pooling emerges as a key strategy in achieving greener, more efficient supply chain.

Source: *Frost and Sullivan Analysis*

4.5.4 Structure of Global Market

In terms of production models, the global market is shifting from fully captive production by end-users to third-party manufacturing and pooling models, especially in mature markets where supply chain optimization is a priority. Leading pallet pooling providers often rely on dedicated manufacturing partnerships, allowing them to focus on asset management, repair, and circulation rather than direct production. This third-party model also supports scalability and customization for diverse client needs, which is becoming essential with the rise of e-commerce and high-velocity distribution environments. In [North America, the EU, Australia and New Zealand] two major companies control the majority of the market, leveraging their scale, established networks, and technological expertise to maintain a competitive edge. This limited competition often results in standardized practices, high-quality service, and the ability to invest in research and development for further automation and efficiency improvements. CHEP (Brambles) operates globally and holds a leading position in North America. In Europe, CHEP and regional players such as LPR (Euro Pallet Pool) play key roles, supported by strong demand from the FMCG and retail sectors. CHEP India was a leading provider of pallet and container pooling services, backed by a long track record, best practices, and strong customer relationships, and was also recognized as the market leader in asset pooling in the container segment in Fiscal 2024, while CHEP (Brambles) was the global leader in asset pooling. LEAP has emerged as the leading pallet pooling player in FY25, driving organized market growth. In the Asia-Pacific region, LOSCAM is the primary player alongside CHEP, serving high-growth markets like China, Australia, and Southeast. The global pallet pooling market is regionally structured and highly concentrated. Europe shows an oligopolistic setup, dominated by CHEP, Euro Pool System with limited room for new entrants. In Asia-Pacific, while more fragmented overall, CHEP and LOSCAM control major markets like Australia, and Southeast Asia. Despite some regional differences, each major market is led by a few strong players, making competition highly concentrated across regions.



Source: *Frost & Sullivan Analysis*

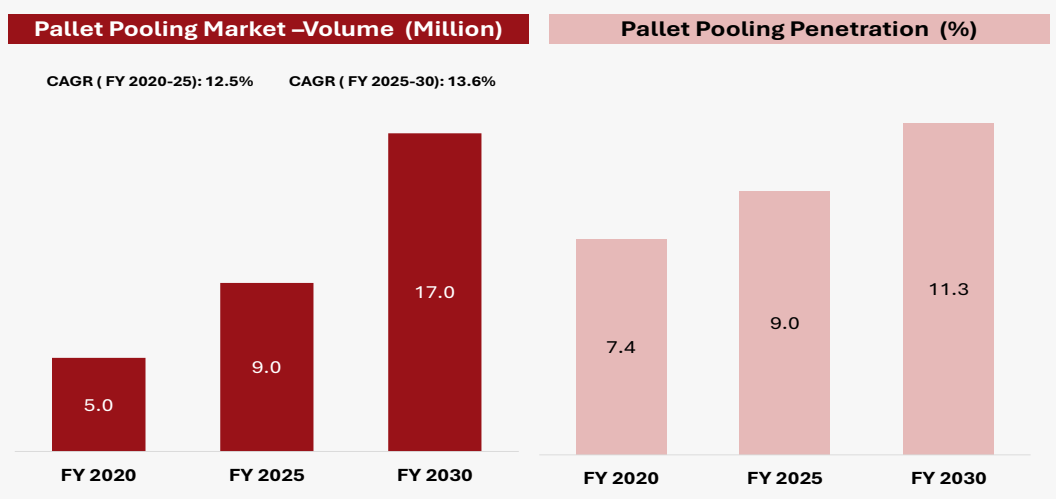
4.6 INDIA PALLET POOLING MARKET

4.6.1 Market Size and Outlook

The Indian pallet pooling market is expected to grow at a high CAGR of 13.6% from FY 2025-30p, driven by increase in palletization and deeper penetration of pallet poolers. Despite a strong growth in pooled pallets, penetration account for just 9% of India's total pallet market by FY2025, indicating substantial room for expansion. India's pallet pooling market is highly concentrated, with LEAP holding the majority of the market share. Pallet pooling model is being adopted by major key industries which are striving to cut logistics costs as well as ensure safety of goods. The

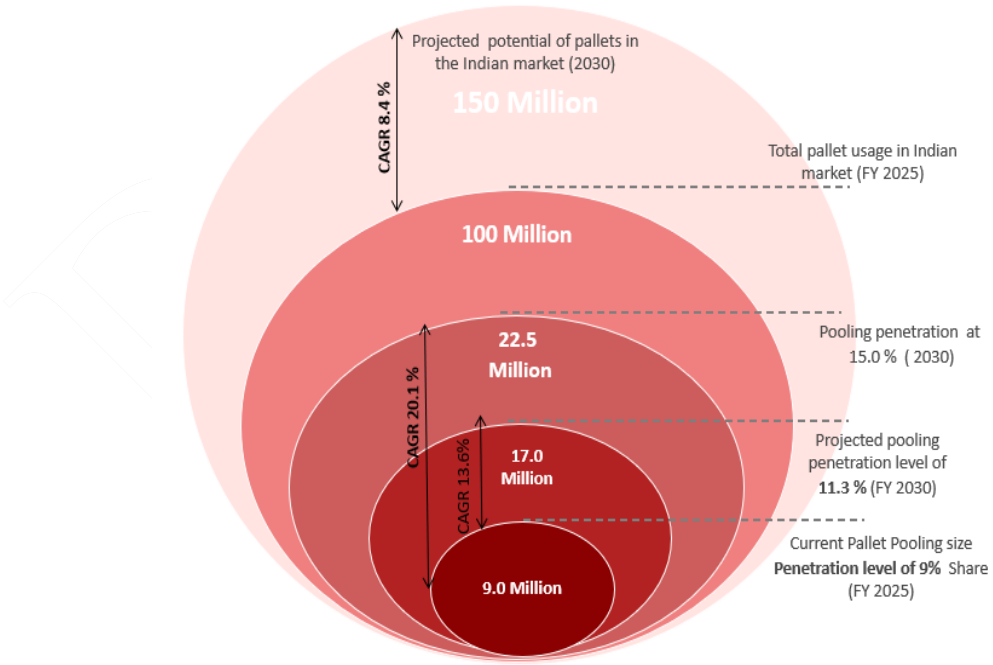
industries spending most on logistics are the food & beverages sector as they require cold chain facilities and special handling while transportation and storage. Figure 4.15 illustrates the pallet pooling market by volume, penetration of pooled pallets from FY2020 to FY2030p. Figure 4.16 quantifies the total addressable market (TAM) for pallet pooling in India for the period FY2025–2030p.

Figure 4.15 Pallet Pooling Market by Volume (Million) and Pallet Pooling Penetration (%), India, FY 2020-30p,



Source: *Frost & Sullivan Analysis*

Figure 4.16: Total Addressable Market – Pallet Pooling, India, FY 2025-2030p



Scenario 1 - Conservative

On the basis of conservative projections, current pallet pooling is expected to increase at 13.6% CAGR to reach 17.0 million pallets in CY 2029, with 11.3% penetration.

Scenario 2 - Optimistic

Assuming a more optimistic 15% market penetration, the market is expected to increase at 20.1% CAGR to reach 22.5 million pallets by FY 2030.

Source: *Frost and Sullivan Analysis*

Criticality of an Effective Pallet Pooling Network

An effective pallet pooling network is critical to ensuring supply chain responsiveness and cost efficiency. A well-distributed and agile network helps reduce overall logistics costs by minimizing the need to reposition pallets across long distances. It also limits the dependence on reverse logistics, as pooled pallets can be redeployed locally, lowering backhaul requirements and related emissions. Additionally, during demand surges or seasonal peaks, a strong pooling infrastructure enables rapid supply of incremental pallet requirements to key hubs, ensuring operational continuity. As a result, the quality and density of the pooling network directly influence turnaround time, scalability, and cost competitiveness, making it a strategic differentiator for logistics providers

4.6.2 Growth Drivers

Pallet pooling in India is gaining momentum due to rising demand for cost-efficient and standardized logistics solutions. Growth is driven by the rapid expansion of organized retail, FMCG, and e-commerce sectors, which require faster turnaround and scalable operations. Additionally, government initiatives promoting supply chain modernization, increasing adoption of automation in warehouses, and the shift towards sustainability are encouraging companies to transition from single-use pallets to shared pooling models, reducing capital costs and improving operational efficiency. Asset pooling business models in India are evolving rapidly, moving beyond initial market acceptance of static hire arrangements (i.e., where pallets are hired to a customer for use at a specific location, typically within the customer's warehouse or facility, for a set period after which the de-hired pallets are returned to the asset provider) to a growing preference for movement hire solutions, (i.e., where pallets are used for transporting goods by supply chain partners through multiple locations, rather than returning pallets directly to the pooling provider at the same location after each use). This shift reflects a broader trend toward more efficient and flexible pooling practices, which are driving beneficial economic outcomes for both providers and customers. The beverage industry in India was among the first to embrace pallet pooling, setting the stage for adoption in other sectors such as automotive, where the continuous transportation of high-volume cargo makes pooling especially advantageous. Figure 4.17 highlights key factors driving the adoption and expansion of pallet pooling in India, including automation, cost efficiency, and rising demand from end-user industries.

Figure 4.17: Growth drivers of Pallet Pooling, India

Pandemic-led outsourcing push	The pandemic has accelerated companies' focus on core operations, leading them to outsource pallet management, which requires capital and operational investments, driving adoption of pooling solutions.
Cost savings across logistics functions	Pallet pooling delivers cost reductions across transport, warehousing, and operations by optimizing pallet use and improving efficiency throughout the logistics chain.
Reduction in in-transit product damage	Pallet pooling ensures consistent pallet quality and standardized handling, minimizing in-transit damage and improving product safety, especially for fragile or high-value goods. This enhances overall supply chain reliability.
Shift toward movement hire model	Companies are increasingly adopting movement hire within pallet pooling as it eliminates the need to manage pallet returns, simplifies operations, and reduces reverse logistics costs. This preference for flexible, pay-per-use pooling services is accelerating the overall adoption of pallet pooling solutions.
Push to Sustainability	Growing environmental awareness and regulatory pressure are encouraging businesses to adopt circular solutions like pallet pooling to reduce waste, emissions, and material usage. .
Operational Flexibility	The growing e-commerce, FMCG, and quick commerce sectors in India demand scalable and on-demand pallet availability, enabling businesses to adapt quickly to fluctuating supply chain needs.
Pooling Network Expansion	Pallet pooling providers are extending their networks into Tier-2 and Tier-3 cities, improving service accessibility, reducing costs, and lowering reverse logistics requirements while accelerating adoption across diverse industries
Ease of Repair and Maintenance	Outsourcing pallet repair and upkeep allows Indian companies, especially SMEs, to reduce operational burden and concentrate on core business activities while ensuring consistent pallet quality.

Source: Frost and Sullivan Analysis

4.6.3 Growth By End-Use Sectors

The below table indicates e-commerce and q-commerce, FMCG and Automotive are few of the fastest growing segments that utilize pallets This growth is being fueled by increasing automation in warehouses, the need for standardized logistics solutions, and India's expanding manufacturing and export sectors under initiatives like Make in India. Consumption-driven industries such as FMCG, F&B, 3PL, e-commerce, quick commerce, automotive, and industrials have shown sustained growth and remain relatively resilient to economic downturns. Effectively serving a diverse range of customers across industry sectors requires a pan-India network, deep domain expertise, strong operational processes, and the agility to meet evolving customer needs. As supply chains modernize, the adoption of pooled pallets is expected to accelerate beyond metro cities into tier 2 and 3 markets, though the industry.

Pallet pooling in India is gaining traction across diverse industries as companies increasingly prioritize cost efficiency, operational scalability, and standardized handling. Sectors such as food and beverages, e-commerce, FMCG, automotive, and industrial manufacturing are driving this growth, supported by the rising adoption of automation and organized logistics practices.

Figure 4.18 forecasts sector-wise pallet pooling adoption in India (2020-2030p).

Figure 4.18: Pallet Pooling Volume by End-Use Sectors, India FY 2020-30p

Industry	FY2020	FY2025	FY2030p	CAGR % (2020-2025p)	CAGR % (2025-2030p)
	Pallet Pooling Market by End Users (In Million)				
Food and Beverages	1.02	2.00	3.99	14.42	14.81
Ecom and Q Com	0.33	0.85	2.22	20.83	21.17
3PL	0.63	1.15	2.19	12.79	13.75
FMCG and Retail	1.36	2.59	4.97	13.75	13.92
Automotive	0.55	0.82	1.32	8.42	9.88
Industrial & Other sectors	0.58	0.79	1.1	6.48	6.74
Other Manufacturing	0.53	0.79	1.21	8.31	8.90
Total Pallet Pooling	5.00	9.00	17.00	12.47	13.57

Source: *Frost and Sullivan Analysis.* ***Note:*** *(1) Industrial & other sectors Include Machinery, Cement, Steel, Chemicals, Consumer Electronics, Paints and Coatings (2) Other Manufacturing -Textiles, Pharmaceuticals, Fabricated Metals, Rubber and Plastics*

4.6.4 Barriers to Entry in the Industry

The Indian pallet pooling industry exhibits high barriers to entry, limiting competition and allowing a select few players to dominate across geographies. The Indian pallet pooling market is dominated by LEAP, which holds 90% of the market share with the largest pallet fleet and nationwide facility network. The market is largely monopolistic or duopolistic, with established leaders holding the lion's share of the industry.

"High infrastructure, tech needs, and compliance needs create entry barriers in India's pallet pooling market, favouring scaled players with strong networks, customer ties, and high switching costs."

New entrants face substantial operational and financial hurdles, including the need for large-scale capital investments in pallet procurement, infrastructure, and advanced tracking technologies. Building a nationwide depot and repair network requires not only high upfront costs but also deep industry expertise to ensure service reliability. Moreover, the dominance of established players with entrenched customer relationships and long-term contracts creates a strong barrier to switching, while compliance with quality

standards and ESG requirements adds further complexity. Together, these factors reinforce the market's monopolistic nature and limit the scope for smaller or new competitors to scale effectively.

Additionally, limited availability of standardized pallets and the high cost of reverse logistics further discourage new players from entering the market. Established players leverage economies of scale, integrated technology platforms, and strong relationships with key industries such as FMCG, retail, and automotive, making it even harder for smaller firms to compete. As a result, market entry often requires strategic partnerships, niche specialization, or significant financial backing to overcome these structural disadvantages.

Figure 4.19 examines key barriers to entry in India's pallet pooling industry (FY2025)

Figure 4.19: Barriers to entry in the Pallet Pooling Industry India, FY 2025

Barrier	Key Challenges for a new entrant
Facility Network (Depots & Mobile Units)	• Requires significant upfront investment to build an extensive network of depots and mobile repair units to ensure nationwide coverage. • Lack of established infrastructure limits service accessibility and competitiveness for new entrants.
Pallet Fleet (Asset Investment)	• Replicating this scale is challenging without the deep knowledge base and operational experience that incumbents have built over years of successfully operating in the market. • Long gestation periods and uncertain demand increase financial risk for new entrants
Customer Relationships	• Established players maintain long-term contracts with key customers, creating high switching costs due to operational reconfiguration, retraining, and system changes. • Tailored, sector-specific services such as pallet customization and integrated warehousing build strong customer stickiness.
Best-in-Class Product Quality & Service Excellence	• Industry leaders ensure consistent quality with imported PEFC-certified softwood pallets that meet high durability and load standards, critical for automated systems and racking. • Compliance with IIP/FSC certifications and global vendor relationships are challenging for new entrants to establish quickly. • Consultative, customer-centric services and integrated pooling solutions are difficult for new players to match.
Network Effects	• A well-distributed depot network enables faster turnaround, lower dead hauls, and efficient reverse logistics—difficult to replicate without years of network build-out. • Scale improves asset utilization and cost efficiency, allowing competitive pricing, closer customer proximity, and stronger client retention.
Knowledge & Technology	• Market leaders leverage advanced tech platforms for real-time tracking, automated billing, predictive maintenance, and ERP integrations (e.g., SAP, Salesforce). • Lack of domain expertise, operational know-how, and consultative capabilities limit new entrants from offering end-to-end supply chain solutions.

Source: *Frost and Sullivan Analysis* ***Note:*** *Depot refers to warehouse*

4.6.5 Key Regulations

- The key certification that is required for exports using pallets is the International Standards for Phytosanitary Measures No. 15 (ISPM15) certificate that was mandated by the International Plant Protection Convention (IPPC) to prevent the presence of pests in pallets during international trade. This certification ensures pallets are treated to prevent the transmission of pests during cross-border trade.

"ISPM15 phytosanitary rules and state-level timber permits create high compliance hurdles, driving corporate preference for organized pallet suppliers in India's export-focused market."

- The Indian regulation around pallets is specific to wood and lays out the terms to be carried out for achieving the ISPM15 certificate for wooden pallets. Most of the organized players adhere to these requirements for hygiene compliance. The biggest pallet pooling companies, globally, and in India, offer ISPM15 pallets to accommodate hygiene as a mandatory regulation for exporting goods.
- Legal sourcing of wood is also strictly regulated. Transit Permit or Felling Permit is required as necessary for the legal and sustainable harvesting, transport, and use of forest timber, depending on the state regulations. These permits are issued by respective State Forest Departments, and its state-specific amendments. These regulatory requirements make it challenging for smaller, informal players to comply, often leading corporates to prefer certified and organized suppliers.
- Timber used for pallet manufacturing must be sourced from authorized forests or plantations with valid permits, ensuring it is not illegally harvested. This process often involves clearance from the Forest Range Officer and records in the Forest Protection Committee in some states. These sourcing regulations, combined with phytosanitary requirements, create a high compliance burden that is often difficult for small-scale and unorganized pallet makers to meet. As a result, larger, organized players with the ability to manage legal sourcing, treatment infrastructure, and certification processes are generally preferred by corporates, especially those in export-oriented and regulated industries.

4.6.6 Sourcing

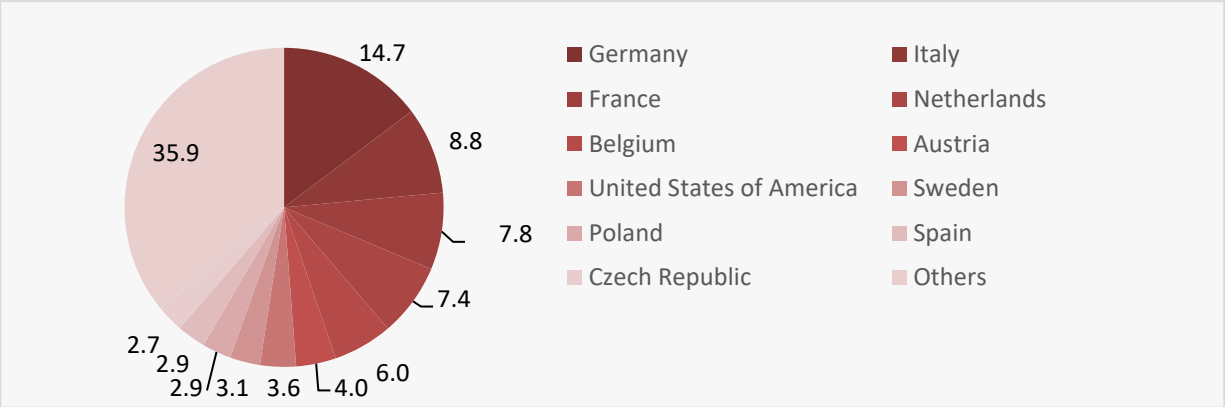
Wood Supply for Pallets and Major Suppliers

- India's domestic timber is mainly hardwood which is dense and heavy. The preferred softwood, which is lighter and easier to handle, must be imported as India lacks softwood forests. This creates dependency on international suppliers and exposes manufacturers to complexities such as import duties, fluctuating exchange rates, and supply chain disruptions. As a result, strong vendor relationships are crucial for ensuring consistent quality, timely delivery, and competitive pricing of imported softwood.
- Product quality is a key factor that determines the success of this operationally demanding pallet services market. High quality raw materials are required to build durable wooden pallets with long shelf life. Quality standards set by leading players like CHEP and LEAP ensure pallets remain durable and usable for over 25 years. Pallets should also have the capacity to manage loads from 1 ton to 4 tons.
- Supply of quality pallets requires a network of pallets manufacturers who can meet the demand requirements of pallet service providers. Leading manufacturers of pallets such as LEAP, host the broadest range of pallets in India. These pallets are manufactured by sourcing timber from countries in Europe like the Baltic States and Oceanic regions.

Domestic Vs. International Market for Supply of Wooden Pallets

India's pallet supply is largely met by countries from the European region, although they remain important suppliers, their collective share has increased marginally from 90 % in FY 2020 to about 91 % in FY 2025 of total wood pallet imports. Top 10 suppliers accounted for 62 % of imports of wooden pallet and related materials. Figure 4.20 shows the regional distribution of wooden pallet supply in India for FY 2025, highlighting key sourcing hubs across the country.

Figure 4.20: Regional Supply of Wooden Pallets and Packaging Materials (%), India, FY 2025



***Source**: Trade Map (International Trade Centre) and Frost and Sullivan Analysis. **Note:** Imports values based on HS Code 441520 (Includes wooden pallets, box pallets, other wooden load boards, and wooden pallet collars and any wooden item used for stacking or transporting goods).*

5 CONTAINER MARKET ANALYSIS

5.1 OVERVIEW OF CONTAINER POOLING MARKET

Containers are used for protecting shipments during transportation and storage since most of these goods go through more than one mode of transport during their transit. Goods need to be packaged so they can endure domestic and export conditions. Optimizing load is a necessity when loading containers for ocean freight for goods safety and an added benefit of shipping cost reduction.

Foldable Large Containers (FLC): With the growth of the agricultural, automotive, textile and apparel industries, FLCs are gaining momentum as they offer safety and are light weighted in comparison to bulk containers. As they are also easy to fold and resistant against extreme weather conditions their market size is increasing at a stable rate. Another factor of this packaging solution registering sales is that the manufacturers are working towards making them environmentally friendly and sustainable which is a major factor in their growth.

Crates: Due to their easy-to-handle design, crates can be used to easily handle heavy load goods with wooden crates being used on a large scale due to their sourcing from natural resources and lower processing cost compared to other crates. Crates are utilized across the supply chain for numerous applications of containerization and transportation of goods with key applicable industries: Automotive & Auto Components, E-commerce & Retail (FMCG, Grocery, Apparel), Food & Beverages, Pharmaceuticals & Healthcare, Electronics & Consumer Durables, Agriculture, Industrial and Renewable Energy. As crates reduce wastage, improve hygiene, and decrease costs while providing maximum safety to goods during transit, their market is expanding amid rising trade volumes and economic growth. Additionally, the reusability and versatile applications of crates have driven strong demand, particularly in export and import operations.

Utility Boxes: Applicable for food & beverages, FMCG, agriculture, logistics, warehouse & cold storage, and retail, utility boxes are light and stackable and therefore they are convenient to use for last mile deliveries for moving consumer goods regularly. Due to their stackable nature, the sales of Utility Boxes are expected to increase in the coming years.

The Indian container market grew from USD 481 million in FY 2020 to USD 829 million in FY 2025 with a CAGR of 11.5 %. Container market is expected to grow by CAGR 17.3 % between FY 2025 and FY 2030, to reach USD 1839 million by FY 2030. This growth can be attributed to expansion of industrial goods, growth of automotive and FMCG goods.

5.2 INDIAN CONTAINER POOLING MARKET

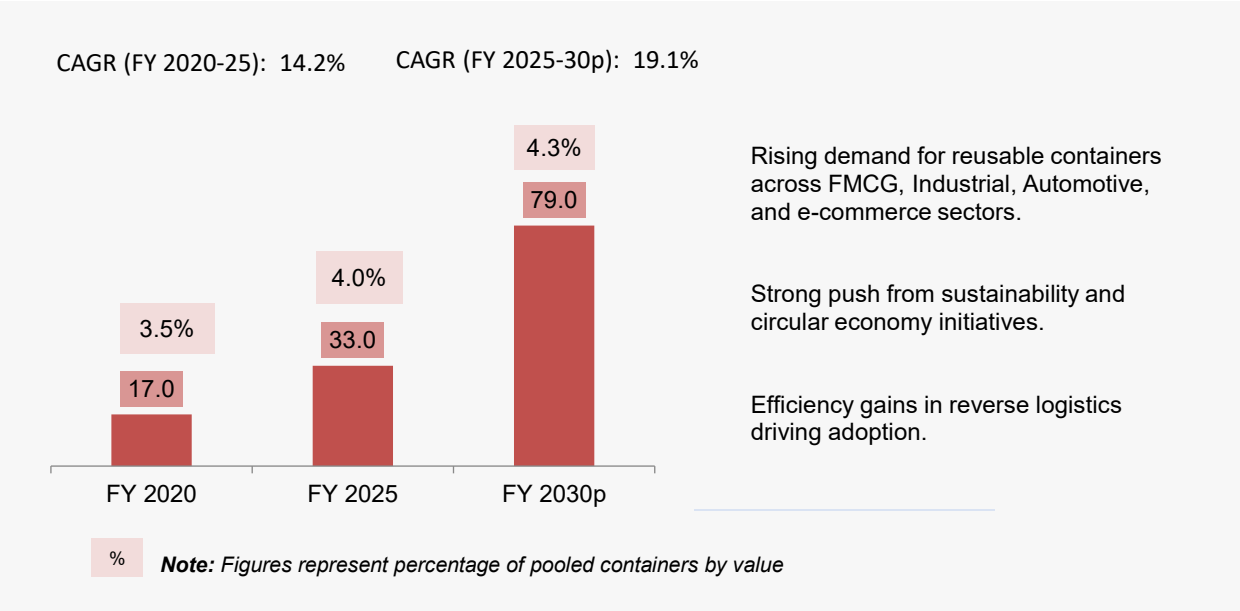
India's container pooling market is gaining traction as industries shift toward asset-light, cost-efficient, and sustainable logistics models. Traditionally dominated by container ownership, the market is now witnessing increased adoption of pooling solutions, especially across sectors like FMCG, organized retail, and 3PL. This shift is further supported by government initiatives such as the National Logistics Policy and Gati Shakti.

5.2.1 Market Size and Outlook

India's container pooling market for FLCs, utility boxes, and crates is growing rapidly, driven by rising demand for reusable and standardized transport solutions. India's container pooling market, though still underpenetrated, is experiencing a strong shift toward shared pooling solutions as companies increasingly prefer flexible, pay-per-use models over traditional asset ownership. The growing need for operational efficiency, sustainability, and seamless 3PL integration is accelerating adoption. Large players are investing in track-and-trace technologies to enhance container visibility and utilization, while sectors like automotive, pharmaceuticals, and cold chain are driving standardization through integrated supply chains. The expansion of temperature-controlled infrastructure is also playing a key role in boosting demand for insulated and reusable containers, reinforcing pooling as a scalable and future-ready solution.

Figure 5.1 shows the projected growth in container pooling penetration by value in India from FY 2020 to FY 2030.

Figure 5.1: Total Container Pooling by Value (USD Million), India, FY 2020- FY2030p



Note: *Figures represent percentage of pooled containers by value*

Source: *Frost & Sullivan Analysis*

5.2.2 Key Factors for Growth

Reusable container solutions such as Foldable Large Containers (FLCs), crates, and utility boxes are gaining strong adoption across industries like automotive, FMCG, pharmaceuticals, and retail as companies prioritize efficiency, sustainability, and operational flexibility. By replacing single-use packaging with durable, returnable units, businesses can significantly reduce packaging waste, lower carbon footprints, and cut long-term costs, directly supporting ESG and circular economy goals. Advancements in high-strength materials, RFID, and IoT-enabled tracking enhance container durability, traceability, and real-time visibility, while compatibility with automated systems, such as conveyor belts, robotic pickers, and automated storage and retrieval systems, enables seamless integration into modern warehouses. Standardized designs allow for optimal stacking, reduced handling time, and improved safety in logistics operations. As production volumes rise and e-commerce accelerates, these containers are becoming essential for managing high-mix, low-volume goods efficiently. Collectively, these factors position reusable container solutions as a critical driver of sustainable and technology-driven supply chain growth.

Figure 5.2 highlights the key factors driving container pooling growth in India by 2025.

Figure 5.2: Container Pooling Growth Factors, India, 2025

Factors	Reasons for growth
Shift to Reusable Packaging	Sustainability focus and cost pressure are accelerating the shift from single use to reusable containers, especially in sectors with high circulation like FMCG, F&B, and retail. This shift also supports circular supply chains and reduces environmental waste.
Cost Efficiency	FLCs and reusable containers reduce packaging costs through repeated use, offering better ROI for bulk movements and high-volume users. Lower unit economics over multiple cycles make them attractive for organized players.
E-commerce & Organized Retail Expansion	Rapid e-commerce growth is increasing demand for durable secondary packaging and reusable containers for faster handling and reverse logistics. These containers help reduce damage during transit and enable smooth reverse flows.
Containerized Packaging in the Auto Components Sector	Containerized packaging supports safe transport of EV parts and high-value components; OEMs prefer foldable/stackable solutions that optimize space and protection. This also aids in standardizing packaging across vendors.
Rising Disposable Incomes & Urbanization	Growing demand for packaged goods in Tier 2/3 cities is increasing usage of hygienic, stackable containers that improve last-mile transport and shelf-ready packaging. Urban retail formats are also encouraging container-based displays.
Manufacturing & Logistics Infrastructure Growth	Infrastructure programs like PM Gati Shakti support container usage by boosting demand for standardized, durable packaging in integrated transport networks. Improved connectivity enhances container cycle speed.
Regulatory Push and ESG Goals	ESG mandates and regulatory frameworks are pushing industries to adopt reusable containers to meet environmental compliance and corporate sustainability goals. This is becoming a key differentiator in procurement decisions.
Warehousing Automation	Standardized reusable containers compatible with ASRS and other automation technologies are being increasingly used to enable smoother operations, reduced errors, and higher throughput. E-commerce now occupies about 45% of India's warehousing space, driving demand for utility boxes and reusable containers that facilitate faster sorting, stacking, and automated handling in robotics- and AI-enabled warehouses. Standardized, durable packaging enhances warehouse operational efficiency.
Food and Cold Chain Demand	Temperature-sensitive goods require insulated, hygienic, and durable containers. Government cold chain initiatives are reinforcing adoption across F&B and pharma. These containers help maintain product integrity during long hauls.
Electronics & Consumer Durables Growth	Durable packaging is needed to prevent damage to fragile goods during transport; reusable containers improve handling efficiency and reverse logistics. Containerized packaging also enables better load planning in distribution networks.
Food & Beverages Expansion	Growth in processed and packaged food is increasing demand for hygienic and stackable reusable containers, supporting operational efficiency in distribution. They also facilitate better FIFO practices and shelf-level visibility.
Industrial Machinery Demand	Government programs such as 'Make in India' and PLI schemes for capital goods drive growth in heavy industrial output. This raises demand for robust, heavy-duty reusable packaging to safely transport machinery parts and components, ensuring protection during long transit and storage. Demand is also rising from capital goods exporters looking for reliable bulk packaging.

***Source**: Frost & Sullivan Analysis*

5.2.3 End-Use Sectors

As manufacturing volumes increase in India and e-commerce continues to grow substantially, the demand for FLCs, crates and utility boxes are expected to rise with larger number of goods with irregular shapes to be transported and stored in warehouses. Figure 5.3 analyses container pooling solutions across key industries, highlighting sector-specific needs.

Figure 5.3: Container Pooling Solutions for End User Industries in India, FY 2020-FY2030p

Industry	FY2020	FY2025	FY2030p	CAGR % (2020-2025)	CAGR % (2025-2030p)
	Container Pooling Market by End Users (In Million USD)				
Food and Beverages	3.40	5.60	12.20	10.49	16.85
Ecom and Q Com	1.02	2.01	5.44	14.53	22.03
3PL	1.19	2.54	5.99	16.37	18.72
FMCG and Retail	3.40	6.20	16.32	12.77	21.36
Automotive	4.25	9.45	24.17	17.33	20.66
Industrials and Other sectors	2.04	3.42	6.98	10.89	15.34
Other Manufacturing	1.70	3.78	7.9	17.33	15.88
Total Container Pooling Market	17.00	33.00	79.00	14.19	19.08

***Source**: Frost & Sullivan Analysis* Note: (1) Industrials Include Machinery, Cement, Steel, Chemicals, Consumer Electronics, Paints and Coatings (2) Other Manufacturing -Textiles, Pharmaceuticals, Fabricated Metals, Rubber and Plastics

End user industries are increasingly adopting reusable packaging solutions as warehouse and transport automation increases. With the growing importance of MHE in warehousing, the packaging solution market is anticipated to strengthen and expand. As the Indian tertiary packaging penetration is quite low, there is a huge potential for the market to develop. Packaging solutions like FLCs and crates have a huge potential and currently cater mainly to the auto component industry. With the development in the automotive sector and increasing sales of auto-components, demand for these solutions is expected to increase. On the other hand, the growth in e-commerce and organized retail market in the country contributes to the use of utility boxes which are widely used for food & beverages, agriculture and FMCG sectors. The e-commerce segment has created a huge demand for utility boxes to store and transport goods easily and safely.

6 MHE MARKET ANALYSIS

"Grade A warehousing and warehouse automation are driving Indian MHE Pooling market which is expected to grow at 18.3 % CAGR between FY 2025 and FY 2030"

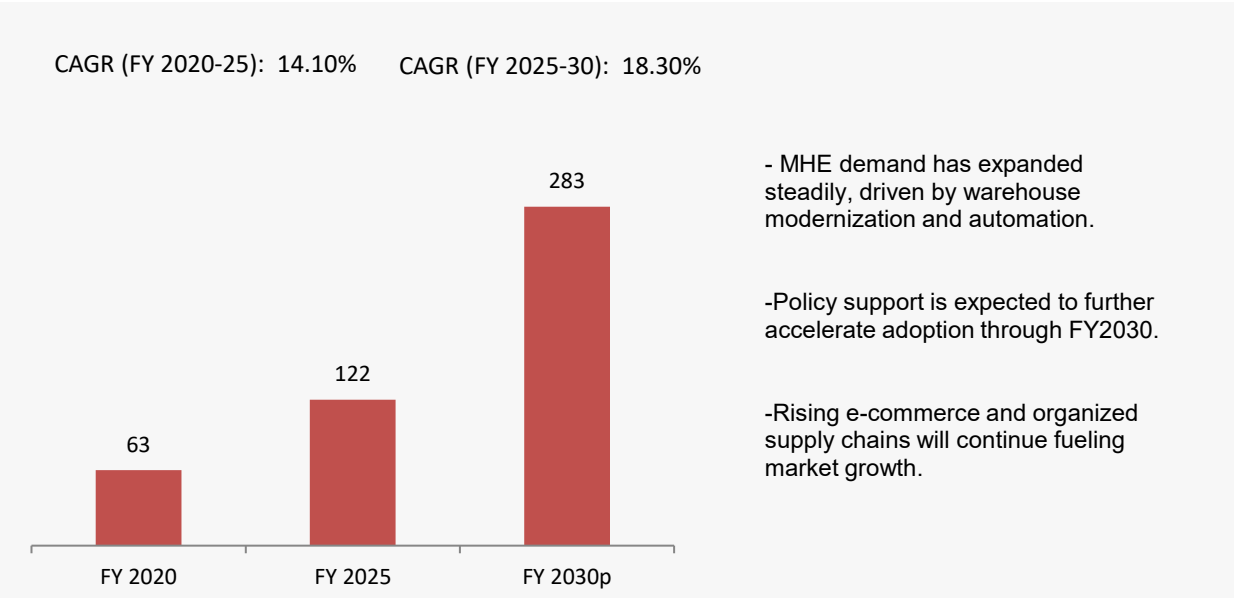
The Material Handling Equipment (MHE) is applied to store, move, transport and distribute materials within the warehouses and in transporting goods between storage locations and vehicles during loading and unloading of goods. Using the appropriate material handling devices, the products can be handled as they move through the supply chain, smooth loading and ejection of product into the road and rail transportation that makes the vehicle turn around to be completed rapidly and decreases the transportation delays; this maintains its quality of service at minimum expenditure. They are used for the movement of goods and materials that are palletized (e.g. Forklifts) and also used for stacking racks within the warehouses (e.g. Semi Electric Stackers). MHE helps in prevention of damage to goods with an added benefit of workers' safety. By eliminating unnecessary movement of goods, it optimizes the flow of goods, thereby ensuring timely operations.

6.1 INDIAN MHE AND POOLING MARKET

6.1.1 Market size of MHE market and outlook

The MHE industry remains closely aligned with the performance of India's manufacturing and logistics sectors, both of which have seen renewed momentum post-pandemic. This growth is being fuelled by rapid infrastructure development, increasing investments in Grade A warehousing, widespread adoption of automation, and the continued boom in e-commerce and omni-channel retailing. Additionally, rising safety and efficiency standards in manufacturing and logistics operations are prompting greater use of advanced MHE. The Indian warehousing landscape is increasingly shifting toward palletized storage systems and vertical racking, where modern MHE such as forklifts, reach trucks, and automated storage solutions play a critical role in improving space utilization and throughput. With ongoing policy support under initiatives like PM Gati Shakti and the National Logistics Policy, the Indian MHE market is expected to continue expanding as supply chains become more organized and automation led. Figure 6.1 presents India's MHE market projections by volume from FY2020 to FY2030 (projected).

Figure 6.1: India MHE Market Size by Volume ('000 Units), FY 2020- FY 2030p



Source: *Frost and Sullivan Analysis*

6.1.2 Growth Drivers

India's material handling equipment (MHE) market is growing rapidly, supported by expanding warehousing, rising automation in logistics, and infrastructure development across sectors. Demand is being driven by the growth of e-

commerce, organized retail, and manufacturing, prompting increased adoption of forklifts, conveyors, and automated storage systems. Businesses are shifting toward more efficient, safe, and tech-enabled handling solutions, while government initiatives like industrial corridors and logistics parks further support modernization. The focus on operational efficiency, safety, and real-time tracking is shaping the next phase of MHE deployment in India. Figure 6.2 presents key growth drivers propelling the Material Handling Equipment (MHE) market in India as of CY 2024, including infrastructure upgrades, automation adoption, and sectoral demand.

Figure 6.2: Growth drivers of MHE Market, India, CY 2024

Warehousing Expansion and Infrastructure Development	The rapid development of organized warehousing, especially Grade A facilities across metro and tier-2 cities, is a major driver for MHE demand. Growth in sectors like e-commerce, FMCG, pharmaceuticals, and 3PL logistics has created a strong need for efficient equipment to manage inventory, stacking, and order fulfilment processes.
Government Policy Push and Logistics Modernization	Initiatives such as PM Gati Shakti, the National Logistics Policy, and investment in multimodal logistics parks are transforming India's supply chain infrastructure. This is encouraging the adoption of modern MHE to enable faster, safer, and more efficient material movement within warehouses and industrial facilities.
Adoption of Automation and Digital Supply Chains	Companies across manufacturing, retail, and logistics are increasingly adopting automation and real-time inventory tracking, which requires compatible MHE such as automated forklifts, conveyor systems, and robotic stackers. Integration with WMS (Warehouse Management Systems) is also pushing demand for advanced, sensor-enabled equipment.
Growing E-commerce and Omnichannel Fulfilment Needs	India's booming e-commerce sector—handling millions of daily shipments—demands high-speed, high-throughput handling solutions. This has led to increased investment in conveyors, sortation systems, automated palletizers, and mobile handling equipment to meet fast order cycles and reduce manual dependence
Rising Safety and Compliance Standards	As factories and logistics hubs place greater emphasis on worker safety and regulatory compliance, there is a growing shift from manual handling to mechanized equipment. Adoption of MHE ensures safer load handling, reduced workplace injuries, and compliance with health and safety norms.
Manufacturing Growth and Industrial Diversification	Under the 'Make in India' initiative and PLI schemes, manufacturing in sectors like electronics, automotive, chemicals, and pharmaceuticals is rising steadily. These industries rely heavily on MHE for handling raw materials, in-process inventory, and finished goods, supporting sustained demand.
Urbanization and Real Estate Consolidation	Urban expansion and the shift toward centralized, vertical warehouses in land-scarce areas have led to increased palletization and vertical racking, both of which require MHE such as reach trucks, stackers, and VNA systems for effective storage and retrieval.
Growing Palletization	Growing palletization is also a key driver of MHE demand, as pallets act as essential facilitators for material handling equipment, supporting efficient storage, movement, and mechanized operations across the supply chain.

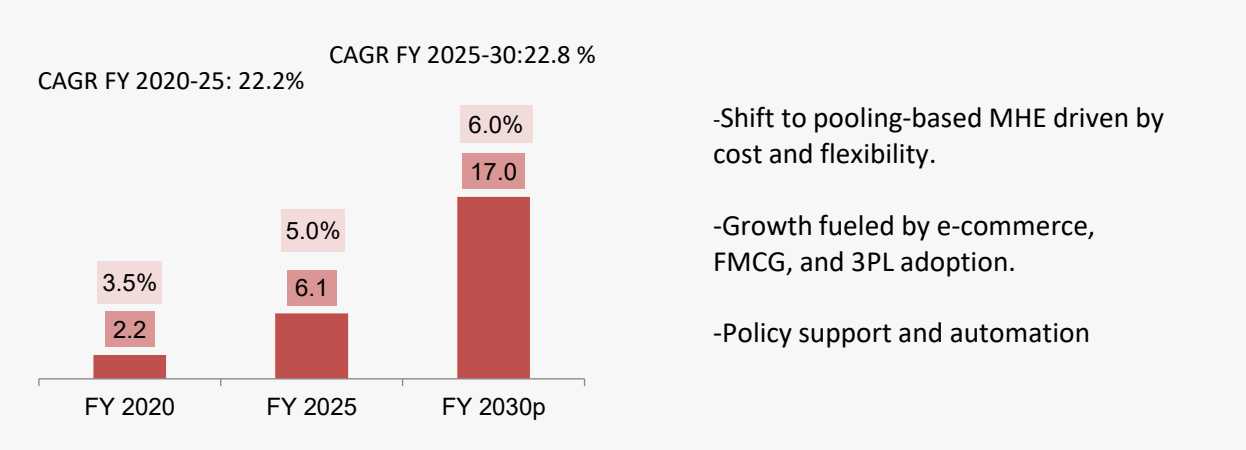
Source: *Frost and Sullivan Analysis*

6.1.3 Market Size of MHE Pooling Market and Outlook

The Indian MHE Pooling market is estimated at 6.1 thousand in FY 25 and is projected to grow at a CAGR of about 22.8 % from FY 2025 to reach 17 thousand units in FY 2030, This growth can be attributed to industries moving towards increasing efficiency, enhancing productivity, maximizing safety and minimizing downtime. Warehouse and storage solutions have been evolving after the onset of the pandemic and end user industries are now looking for complete material handling solutions for their material handling requirements rather than just buying or pooling MHE equipment. India's MHE Pooling penetration is expected to grow from 5.0 % in FY 2025 to 6.0 % in FY 2030 as logistics operations move towards automation.

Figure 6.3 presents India's MHE pooling market projections by volume from FY2020 to FY2030 (projected).

Figure 6.3: India MHE Pooling Size by Volume (000' Units), FY 2020-30p



Source: Frost & Sullivan Analysis

% ***Note:*** *Figures represent percentage of pooled MHE by volume*

The growth in MHE Pooling in India is anticipated to be largely influenced by the growing wet leasing MHE business model in the coming years. Growth and development of various industries like e-commerce, FMCG and logistics sector in India are expected to boost quick adoption of MHE through pooling services to automate operations and stay competitive in a rapidly changing business environment. High costs related to MHE purchase as well as training of staff to operate MHE has created a demand for wet leasing of MHE in India. Figure 6.4 identifies key growth drivers for India MHE Pooling adoption in CY2024.

6.1.4 Growth Drivers

Figure 6.4: Growth drivers of MHE Pooling, India, CY 2024

Shift to Asset-Light Models through MHE Pooling	With capital-intensive requirements for forklifts, stackers, cranes etc., many Indian businesses are opting for equipment pooling and leasing models to avoid high Capex. This model allows companies to redirect capital into core operations while outsourcing the ownership, maintenance, and depreciation risks to pooling service providers. This is especially attractive for warehousing, logistics, and mid-size manufacturers looking to scale without heavy upfront investments.
Warehouse Modernization and Growth of Palletized Storage	India's shift toward organized warehousing and palletized storage systems, driven by GST-led unification, e-commerce growth, and 3PL automation, is accelerating the demand for pooling. MHE Companies are increasingly pooling electric forklifts, VNA trucks, and automated retrieval systems to manage high-density inventory while avoiding large capital outlays and improving operational flexibility.
Operational and Financial Efficiency through Pooling	Pooling models offer additional advantages by eliminating maintenance, repair, and downtime-related costs, which are handled by the equipment provider. For businesses operating in time-sensitive environments, such as e-commerce, FMCG, and 3PL logistics, having access to reliable, ready-to-use MHE without long lead times adds significant operational flexibility.
Reduced Insurance and Administrative Burden	High-value MHE typically requires extensive insurance coverage for risks including fire, theft, and workplace accidents. By leasing or pooling MHE, Indian companies can benefit from insurance coverage bundled into the service contract, resulting in lower costs and reduced administrative complexity compared to insuring self-owned assets. Additionally, the need for trained staff to safely operate such equipment has led to increased preference for pooling models that offer MHE along with skilled operators, further driving the growth of the MHE Pooling market.
Government Push for Infrastructure and Logistics Reform	National initiatives like PM Gati Shakti, the National Logistics Policy, and investments in multimodal parks and industrial corridors are accelerating the shift toward integrated and automated material movement. To align with these developments without heavy upfront capital expenditure, companies are increasingly turning to MHE Pooling models, enabling access to advanced equipment while preserving financial flexibility.

Source: Frost and Sullivan Analysis

7 ESG IMPACT ANALYSIS

"ESG impact analysis reveals how pooled assets and material choices such as wooden versus plastic pallets directly affect carbon emissions, resource conservation, and ethical sourcing within the supply chain."

Environmental, Social, and Governance (ESG) factors are now central to evaluating operational resilience, regulatory compliance, and long-term value creation in supply chain and logistics systems. Asset pooling models such as shared pallets and material handling equipment (MHE) offer measurable ESG benefits by promoting circularity, reducing resource consumption, and enabling transparent governance. This section provides a detailed analysis of the ESG impact of pooled logistics assets compared to conventional systems, with specific emphasis on material choices, energy sources, and benchmarking against global best practices. The aim is to assess how pooled assets contribute to sustainability objectives, regulatory alignment, and social responsibility across logistics operations. Asset pooling is accelerating, supported by end-user growth, warehouse upgrades, automation, and rising ESG focus across key sectors like FMCG, F&B, e-commerce, and automotive.

7.1 ESG IMPACT OF POOLED ASSETS – PALLETS, CONTAINERS AND MHES

Pooled pallets and MHE offer a fundamentally more sustainable alternative to single-use or dedicated logistics assets by maximizing reuse and minimizing waste. In a pooled system, assets like pallets are shared across multiple customers and returned, inspected, repaired, and reused, significantly reducing the need to manufacture new units. This model drastically cuts carbon emissions associated with timber harvesting, plastic resin production, and energy-intensive manufacturing. For instance, CHEP's global pallet pooling operation enabled avoidance of over 2.4 million tonnes of CO_2 and saved 3.2 million trees in one year alone. LEAP India, operating at scale within the Indian market, reports saving 1.97 million tonnes of CO_2, 216,748 tonnes of waste, and 1.73 million trees through its pooled pallets and FLC as of March 2025. Additionally, optimized pooling networks reduce empty freight miles by rebalancing assets efficiently thus contributing to fuel savings and reduced Scope 3 emissions.

Pooling platforms inherently support better governance through centralized asset management and digital traceability. This traceability also simplifies compliance with regulatory standards (e.g., ISPM-15 for wooden pallets in export shipments, emissions standards for diesel MHE). Pallet pooling providers typically adhere to sustainability standards, sourcing FSC- or PEFC-certified timber and ensuring that pallets meet health and safety norms. By outsourcing logistics equipment management to a pooler, companies benefit from a compliant, auditable, and environmentally optimized logistics infrastructure, reducing reputational and operational risks associated with poorly managed supply chains. Figure 7.1 measures the ESG benefits of pooled pallets and MHE solutions across environmental, social, and governance dimensions (Global, CY2024)

Figure 7.1: ESG Overview of Pooled Pallet and Pooled MHE Solutions, Global, CY 2024

ESG Dimension	Pooled Pallets	Pooled MHE
Environmental	Reduced deforestation- Lower emissions via reverse logistics- Waste reduction	Lower carbon emissions (electric fleets)- Reduced equipment overproduction- Battery recycling
Social	Safer work conditions- better pallet quality Adherence to improved labour standards by pooling firms	Operator training- Safety enforcement- Maintenance worker welfare
Governance	Improved traceability- ESG-compliant procurement- Supplier transparency	Telematics for monitoring- Enforceable ESG terms- Centralized compliance oversight

Source: Frost and Sullivan Analysis

7.2 ESG Impact of Wooden Pallets vs Pallets made on Plastic / other materials

Wooden and plastic pallets offer different environmental and operational trade-offs, but wooden pallets are generally more sustainable when viewed across the full life cycle. Made from renewable and biodegradable materials, wooden pallets have a lower carbon footprint during production and can be sourced from sustainably managed forests. They are also easier to repair and reuse, and at the end of their service life, can be recycled or repurposed into biomass or mulch, reducing landfill burden. In contrast, plastic pallets are manufactured from fossil-based polymers and require significantly more energy to produce. While they tend to last longer and perform well in closed-loop systems with high return rates, the environmental benefits of plastic pallets depend heavily on the success of recovery and recycling programs, which can be inconsistent. From a social and economic standpoint, wooden pallets support local industries and rural employment through decentralized manufacturing and repair networks. Plastic pallet production, by comparison, is more capital-intensive and centralized, which limits community-level participation. Although plastic pallets offer some regulatory advantages in international trade by being exempt from certain phytosanitary treatments required for wood, they present more complex challenges in end-of-life management. Figure 7.2 demonstrates the ESG Comparison of wooden pallets vs Plastic Pallets.

Figure 7.2. ESG Comparison of Wooden pallets vs Plastic Pallets

Criteria	Wooden Pallets	Plastic Pallets
Sustainability	Sourced from renewable materials; bio-degradable and compostable	Made from fossil-based materials; long-lasting but not biodegradable
Carbon Footprint	Lower carbon footprint at production stage; easier to repair	Longer service life reduces frequent replacements, but manufacturing is energy-intensive
Durability	Adequate for short- to medium-term use; repairable when damaged. With proper processes, pallets can last for 25+ years.	Durable with long life, but prone to deformation under heavy loads, warping in heat, and friction issues
Hygiene & Cleanability	Needs treatment to prevent moisture; suited for dry goods	Moisture-resistant; preferred in food, pharma sectors
Reusability	Reusable, easily repairable, and compatible with automation.	Highly reusable, but damaged units typically require replacement rather than repair.
End-of-Life Disposal	Biodegradable or reused as fuel/secondary use	Recyclable via specific channels; risk of waste if unmanaged
Recyclability	Recycled into wood composites or mulch	Fully recyclable but needs dedicated infrastructure

***Source**: Frost and Sullivan Analysis*

Overall, for most general-use and open-loop supply chains, wooden pallets remain the more environmentally and socially responsible choice if sourcing and disposal are properly managed.

7.3 ESG Impact of Lithium-ion vs diesel MHE

Lithium -ion powered MHE especially electric forklifts offer substantial reductions in carbon and pollutant emissions compared to diesel-powered equipment. A typical 2.5-ton diesel forklift emits approximately 5–8 kg of CO_2 per hour of operation, along with nitrogen oxides (NO_x), sulphur dioxide, and particulate matter. In contrast, electric forklifts powered by lithium-ion or lead-acid batteries emit zero on-site emissions and, depending on the electricity source, can reduce lifecycle emissions by up to 75%. The energy efficiency of electric drivetrains is significantly higher about 85–90% compared to 30–40% for internal combustion engines. Although battery manufacturing is carbon-intensive, especially for lithium-ion, this is typically offset within 12–24 months of regular use. Additionally, electric MHE support renewable energy integration and reduce dependency on fossil fuels, contributing directly to Scope 1 and 2 carbon reduction targets.

The workplace safety and health advantages of electric MHE are compelling. Unlike diesel equipment, battery-powered units do not produce exhaust gases, eliminating indoor exposure to harmful pollutants such as CO and diesel particulate matter, known carcinogens linked to respiratory diseases. Noise levels are also lower, creating a more comfortable and less stressful work environment. Moreover, electric forklifts reduce vibration and offer smoother

handling, lowering physical fatigue and risk of repetitive strain injuries. From a social ESG lens, transitioning to electric MHE signals a commitment to worker well-being and compliance with occupational health standards.

Lithium ion powered MHE aligns well with evolving regulatory and ESG governance frameworks. Many jurisdictions are phasing in stricter emissions regulations for off-road equipment, and some are introducing outright bans on diesel use in enclosed or urban logistics spaces. Companies adopting electric fleets are future-proofing operations against compliance risks and carbon pricing. Furthermore, electric MHE can be integrated into digital fleet management systems, enabling real-time monitoring of energy use, charging cycles, and predictive maintenance enhancing accountability and reporting under ESG disclosures. However, governance around battery lifecycle particularly safe handling, storage, and end-of-life recycling is critical. While lead-acid batteries currently benefit from well-established recycling systems, lithium-ion batteries offer several operational and environmental advantages. These include longer lifespan, higher energy efficiency, lower toxicity, better temperature tolerance, and reduced maintenance requirements. As recycling infrastructure for lithium-ion batteries continues to mature, these benefits position them as a more sustainable long-term solution despite current end-of-life challenges. Diesel equipment, on the other hand, requires complex compliance with emissions, storage, and hazardous waste handling, making electric solutions cleaner and simpler from a governance perspective. Figure 7.3 compares battery-powered and diesel-powered MHE across eight ESG criteria including emissions, air quality, worker safety, and regulatory compliance.

Figure 7.3: ESG Comparison of Battery-Powered vs. Diesel-Powered MHE, Global, CY 2024

ESG Criteria	Electric MHE	Diesel MHE
Emissions	Zero tailpipe emissions (local); may have upstream emissions	High CO_2, NOx, and particulate emissions
Air Quality	Improves indoor and outdoor air quality	Contributes to air pollution, harmful in enclosed areas
Waste & Disposal	Battery recycling required; risk of hazardous waste if mismanaged	Oil filters, used oil, and emissions systems need disposal
Worker Health & Safety	Lower exposure to pollutants and noise	Higher health risks due to emissions and noise
Operating Conditions	Better for indoor environments	Requires ventilation and limits indoor use
Training & Maintenance	Less complex maintenance; needs electric safety training	Familiar to workforce but requires hazardous material handling
Regulatory Compliance	Easier to comply with emissions and noise regulations	Stricter emissions regulations and likely future restrictions
ESG Reporting	Supports positive ESG disclosures	Negative ESG metrics unless offset by sustainability actions
Investment Attractiveness	Aligns with ESG-focused investors	May face divestment pressure

***Source**: Frost and Sullivan Analysis*

7.4 ESG BENCHMARKING OF LEAP VS GLOBAL PLAYERS

CHEP (Brambles), through its global “Share and Reuse” pooling platform, is a pioneer of circular supply chains—enabling massive environmental savings by replacing single-use packaging with reusable pallets and containers. In North America alone, its model eliminated 2 million tonnes of CO_2 and saved 3 million trees in one year. The 2024 Sustainability Review further highlights a reduction of Scope 1–3 greenhouse gas emissions by 15% (vs FY2020 baseline), with ongoing carbon-neutral operations and 42% recycled content in plastic materials used. CHEP holds top-tier ESG credentials, among them CDP, EcoVadis (Gold Award), Dow Jones Sustainability Index, and MSCI (AAA)—and continues to advance its regenerative vision through initiatives like the Zero Waste World program and CarbonNeutral® half-pallets.

PECO Pallet, though smaller in scale, places a strong emphasis on sustainability. It operates a closed-loop pallet system with about four reuse cycles per pallet per year. PECO emphasizes timber recycling, turning all wood waste into mulch or fuel and recovering metal components like nails. PECO adheres to a zero-wood-to-landfill policy and uses 100% FSC-certified lumber. PECO was featured in the Inbound Logistics Green 75 and holds an EcoVadis sustainability rating, which is a global platform assessing companies' environmental, social, and ethical performance across their supply chains (EcoVadis), signalling ongoing ESG improvements.

Euro Pool Group (EPG), Europe's leading logistics provider for returnable packaging in the fresh produce sector, also shows strong ESG performance. EPG operates around 121 million pallet movements annually, its circular initiatives have reduced CO_2 emissions per pallet by 6% and per tray by 14% since 2017, with a goal of reducing emissions per delivered pallet by 20% by 2025. The company also ensures 100% of its wood is saved and PEFC- or FSC-certified, supporting sustainable forestry. Figure 7.4 benchmarks key global pallet pooling providers across ESG performance metrics including CO_2 reduction, circularity, certifications, and governance (CY2024).

LEAP, founded in 2013, is the country's largest pallet pooling and returnable packaging solutions provider, offering pallets, Foldable Large Containers (FLCs), crates, and utility boxes. Operating on a closed-loop model, it enables customers to replace single-use packaging with durable, reusable assets, reducing environmental impact and supporting circular economy practices. LEAP sources certified lumber, integrates RFID-based asset tracking, and runs repair-and-reuse programs to extend asset life. The company's sustainability initiatives focus on waste reduction, resource conservation, and operational efficiency, positioning it as a leading sustainable logistics partner in the Indian market.

Figure 7.4: ESG Benchmarking of Leading Pallet Pooling Providers, Global, CY 2024

ESG Pillar	CHEP (Brambles)	PECO Pallet	Euro Pool Group (EPS/LPR)	LEAP
Trees saved	Not disclosed	Not disclosed	Not disclosed	1.97 million
CO_2 Consumption Saved	1.8 Mt CO_2 avoided in 2024; net-zero target by 2040	Not disclosed; circular model	20% CO_2 reduction per movement by 2025	1.97 Mt CO_2 avoided over 5 years through reuse; early-stage disclosures
Waste Saved	Strong focus on zero waste and reuse	Not disclosed	High reuse and closed-loop design	0.18 million tons avoided via pooling and reuse.
Wood Saved	Emphasis on FSC-certified and recycled wood	Not disclosed	Tray-based design; minimal wood use	0.28 million trees saved through reusable pallets.
Water Saved	Not specifically disclosed; benefit via reuse efficiency	Not disclosed	Aligned with lifecycle water minimization	82 million kilolitres conserved by reducing material use.
Certifications & Awards	CarbonNeutral®, FSC®, Zero Waste	EcoVadis Bronze, Green 75 recognition	Strong governance; aligned with EU sustainability	Sustainable Business of the Year by World Sustainability (A For Purpose Organization – 10th Edition)
Governance & Safety	Digital tracking; global safety standards	ESG embedded in core ops	Board-led ESG, safety infrastructure and training	Building ESG policies; digital systems for asset tracking

***Source**: Frost and Sullivan Analysis*

8 COMPETITIVE ENVIRONMENT

"The global pallet pooling market is highly competitive, led by CHEP globally and strong regional players like LOSCAM, PECO, and LPR. Scale, network reach, and sustainable reuse are key factors that set leaders apart."

Competition in the global pallet pooling market is defined by the scale, network efficiency, and sustainability credentials of a few dominant players. The pallet pooling market globally is highly consolidated in developed countries, with only a few dominant players. This limited competition often results in standardized practices, high-quality service, and the ability to invest in research and development for further automation and efficiency improvements. Globally, this industry is typically characterized as a monopoly or duopoly within individual countries. While CHEP (Brambles) leads worldwide with unmatched geographic reach and asset base, strong regional challengers like LOSCAM in Asia-Pacific, LEAP in India, PECO Pallet in North America, and Faber or LPR in Europe ensure that the market remains dynamic and locally responsive.

As supply chains become circular and cost pressures intensify, the industry's future will be shaped by each provider's ability to deliver consistent quality, maximize reuse, and leverage technology to optimize pooling operations As supply chains across sectors in India and globally evolve toward higher efficiency, traceability, and sustainability, the role of asset-based logistics solutions such as pallet pooling and material handling equipment (MHE) leasing has become increasingly critical. In India, the push toward reducing logistics costs, improving warehouse automation, and embracing circular economy models has accelerated demand for organized pallet and MHE service providers. While the global market is led by large-scale players with established networks and digital capabilities, the Indian market is seeing rapid formalization and scaling, especially in pallet pooling and MHE Pooling. Global leaders like CHEP, LOSCAM, PECO Pallet, LPR, LEAP, and Faber serve as strong benchmarks for scale-driven efficiency, technology integration, and sustainable pooling operations. Their models highlight best practices across regions and act as directional references for India's rapidly formalizing pallet pooling and MHE ecosystem.

8.1 COMPETITIVE LANDSCAPE -GLOBAL PALLET POOLING SERVICES

The global pallet pooling market is led by dominant players with specialized service models across regions, driven by rising focus on sustainability, automation, supply chain optimization, and standardized reusable packaging solutions. While global leaders serve multinational supply chains, regional specialists offer tailored solutions addressing sector-specific and regulatory needs.

Market Composition

The global pallet pooling market extends beyond just pallets to include a wide range of returnable transport packaging (RTP) assets such as reusable plastic crates (RPCs), foldable large containers (FLCs), bins, trays, and cages. These assets are increasingly pooled to serve industries like FMCG, food & beverage, fresh produce, retail, manufacturing, and global logistics, offering operational efficiency and waste reduction across supply chains.

Competitive Landscape

The global pooling market is led by major players such as CHEP (Brambles), LOSCAM (CITIC Capital), Euro Pool Group, Faber Halbertsma, LPR (La Palette Rouge), IPP (Faber Group), Tosca, Contraload, PECO Pallet, Japan Pallet Rental Corporation, Korea Pallet Pool, iGPS Logistics, and LEAP, which serves as the front face of pallet pooling in the Indian market. These companies dominate across regions, offering standardized reusable packaging solutions for FMCG, retail, fresh produce, and manufacturing sectors, supported by growing technology adoption and sustainability initiatives. Key features of services offered by these players include Cost efficient, ESG-compliant circular supply chain pooling models supported with digitally enabled asset tracking, predictive analytics, and utilization optimization.

Barriers To Entry

- Strategic-capital investments for diversified fleet scale
- Complex international reverse logistics infrastructure
- Standardization and regulatory compliance for food-grade logistics
- Digital technology investments for IoT-enabled tracking and predictive analytics
- High switching costs for customers due to long-term contracts and operational integration

Emerging Trends

- Growing focus on automation, predictive analytics, and telematics platforms
- Circular economy alignment with sustainability-focused asset management
- Expansion of reusable packaging for fresh produce, FMCG, beverages, and retail
- Investments in digital visibility, traceability, and loss prevention

While the global pallet pooling market comprises numerous players, there are only a few players operating at scale with asset pooling as one of their core offerings. There are other players operating in the market that have not been considered for benchmarking as either they are smaller regional players or are a part of larger diversified organisations with pallet pooling being only one of the adjacent offerings. LEAP is currently the only player in India that operates at a considerable scale and at a national level in the pallet pooling segment, therefore there are no like to like comparable.

Brambles is an international and listed (in Australia) pallet pooling company, however it is a not a suitable comparable to LEAP due to multiples reasons including -significantly higher size compared to Leap and operating across multiple geographies with differences in the supply chain systems and pallet pooling market dynamics versus India - LEAP's primary geography of operation, and due to differences in geography of operation, the growth of the underlying businesses are significantly different. LEAP is currently the only player in India that operates at a considerable scale and at a national level in the pallet pooling segment, therefore there is no comparable for LEAP in India.

Key Leading Players in Pallet Pooling

CHEP (Brambles): CHEP is the global leader in pallet pooling, with a dominant presence across North America, Europe, and the Asia-Pacific region, offering standardized and sustainable logistics solutions at scale. Differentiates through large-scale global operations, strategic investments in automation, IoT platforms, supply chain digitization, and ESG-compliant circular supply chains. CHEP, owned by Brambles Limited, is the world's largest pallet and container pooling company, founded in Australia after WWII and now operating in over 60 countries with around 330–360 million pallets, crates, and containers in circulation. CHEP's core business operates on a large-scale "share and reuse" model, distinguished by its global reach, standardized processes, and proprietary tracking systems, setting it apart from smaller or regional pooling players. This model significantly boosts efficiency and sustainability across international supply chains. The company is known for its strong recovery network (including GPS tracking and "pallet detectives"), IoT-based tracking technology, and global service centers. It serves major FMCG, retail, automotive, and manufacturing sectors. CHEP is also a leader in sustainability, ranking among the world's most sustainable companies, with carbon-neutral operations and ambitious circular economy goals.

LOSCAM: is one of Asia-Pacific's leading pallet pooling and returnable packaging providers, originally founded in 1942 and now headquartered in Hong Kong. Operating across 12 regions — including Australia, New Zealand, Greater China, and Southeast Asia - LOSCAM offers a wide range of pooled equipment such as wooden and plastic pallets, steel cages, bins, retail-ready crates, and dollies. Their service model allows manufacturers and retailers to rent these assets, while LOSCAM handles delivery, collection, inspection, repair, and reuse, all managed through their LOSCAM Online digital platform. Owned by China Merchants Group and partially by Mubadala, LOSCAM is known for its regional expertise, sustainability focus (like timber from certified plantations and lighter pallet designs), and strong presence in industries like FMCG, cold chain, and automated warehousing. It competes with global players like CHEP but remains the dominant player in the Asia-Pacific pallet pooling market. LOSCAM is rapidly expanding its footprint through investments in digital tracking, telematics, predictive analytics, and advanced technology platforms.

PECO Pallet Inc. is a leading North American pallet pooling provider, founded in 1997 and headquartered in Itasca, Illinois. The company specializes in renting high-quality, heavy-duty 48″ ×40″ block pallets to manufacturers, distributors, and major retailers across the U.S., Canada, and Mexico. PECO manages the entire pallet lifecycle — delivery, pickup, inspection, repair, and reuse — ensuring consistent quality and sustainability. With a network of over 1,200 service locations and a customer base of more than 200 major companies, PECO is known for its reliable service, operational excellence, and commitment to reducing waste through reuse and recycling.

PACK (Pallets as A Circular Koncept) Pallet Pooling LLC: Founded in 2020 and based in Saudi Arabia, delivers a streamlined, fully outsourced pallet pooling solution centered on its signature red pallets. Its circular service covers everything from ordering and delivery to collection and redistribution, optimizing supply chain efficiency at every step. Designed for compatibility with various production and picking systems, these wooden pallets are built for repeated use, supporting PACK's "Reuse, Recycle, Reduce" sustainability philosophy. The company emphasizes operational

clarity and cost savings, while its red pallets are backed by quality control across service centers, ensuring consistent performance across the Middle East.

LPR (La Palette Rouge): Euro Pool Group is one of Europe's leading providers of reusable packaging and logistics solutions for the fresh produce supply chain, known for its extensive network and closed-loop systems that enhance supply chain sustainability. Leveraging this strong foundation, LPR is a key division of Euro Pool Group, specializing in wooden pallet pooling. Founded in 1992 in Toulouse, France, LPR focuses on FMCG, beverage, and retail sectors across 15+ European countries, operating 130+ service centres and managing 40–70 million pallet movements annually. The company differentiates itself through customized pooling programs, extensive depot network expansion, technology investments, and standardized pallet models (UK100, PR080, DU608, DP610, RQP46) managed via a closed-loop model for delivery, collection, inspection, repair, and reissue—ensuring supply chain efficiency and hygiene.

Faber Group (formerly Faber Halbertsma Group) is a Dutch, family-owned circular load-carrier services provider founded from timber/barrel-making roots in 1891, formally merging in 1992 and rebranding in 2021. The company operates across Europe via specialist subsidiaries—IPP, PRS, PAKi, and vPOOL - pallet pooling solutions, reusable containers, and digital IoT-enabled tracking solutions, supported by timber sourcing through Satim and tech innovation via Faber LABS. With a EUR 415 million revenue in 2024, around 686 employees. Faber emphasizes sustainability, circularity, and data-driven logistics to extend asset lifecycles (up to 10 years) while reducing environmental impact.

LEAP: LEAP has effectively established and led the pallet pooling industry in India, being the only company to operate pallet pooling at this scale with a pan-India network. LEAP has established itself as a leading solutions partner in the electric material handling space. LEAP is the largest on-demand asset pooling provider in India's supply chain management sector (based on a number of pooled assets). LEAP has a pan-India network of over 7000 customer touchpoints, 30 fulfilment centres and over 13.3 million pooled assets (including pallets, containers, and MHEs). Building a fleet similar to LEAP's would require substantial investment over multiple years with no assurance of immediate customer demand or established distribution channels. LEAP operates a full-service model covering warehousing, and distribution of returnable packaging assets. Known for innovation in lithium-ion powered forklifts and IoT-driven fleet management, LEAP supports sustainable and efficient supply chain operations. Recognized as one of the leading forklift pooling players and a leader in the lithium-ion segment of MHEs, having been the first to introduce these solutions in India, it serves over 900 clients across FMCG, auto, industrials, and logistics. LEAP is a multi-award-winning company (India Today, SCM Pro, HCEBP) and continues to lead digital transformation and ESG practices within India's asset pooling ecosystem. LEAP was the first company to introduce passive RFID-tagged containers in India. The company has gained deep expertise that is hard to replicate, providing a clear competitive advantage. LEAP pioneered the introduction of pallets in India and is the first company in the country to introduce several innovative products, such as belts and wedges, utility boxes, and stillages, among others, on an integrated basis.

8.2 KEY PLAYER PROFILES OF PALLET PROVIDERS (GLOBAL)

Figure 8.1 and 8.2 illustrates the competitive global landscape of the pallet pooling market in CY 2024.

Figure 8.1: Competitive Environment: Pallet Pooling Market, Global, CY 2024

Category	CHEP (Brambles)	LOSCAM	LPR – La Palette Rouge	LEAP
I Operational Analysis				
1. Company Background	Founded 1946, HQ Sydney; global leader in pallet pooling (Brambles).	Founded 1942, HQ Hong Kong; strong APAC presence; owned by CITIC.	Founded 1992, HQ France; part of Euro Pool Group.	Founded 2013; India's largest pallet pooling company
2. Footprint & Industries	FMCG, retail, pharma, automotive, logistics.	FMCG, retail, pharma, industrial, fresh produce.	FMCG, food & beverage, logistics.	Broad across FMCG, food & beverage, 3PL, e-commerce/quick commerce, automotive & industrial
3. Market Share in Focus Geography	26% NA, 16% EU, 65% ANZ, 53% GCC	75% China, 34% ANZ	6.7% Europe	90% India
4. Product Portfolio	Pallets and Containers.	Pallets and Containers.	Pallets	Pallets and Containers
5. Customer Retention	90%	80%	90%	91%
6. Revenue Split by Geography	46% NA, 28% EU, 8.4% LATAM, 7.8% ANZ, 9.8% others	60% China,30% ANZ and 10% others	100% Western Europe.	100% India
7. Units in Circulation	Over 348 million	Over 78 million	Over 45 million	Over 13.3 million
II Financial Analysis in USD Million				
8. Revenue (FY 2023)	USD 6,070 million	USD 320 million	USD 420 million	USD 31 million
(FY 2025)	USD 6,670 million	USD 350 million	USD 460 million	USD 57 million
9. Avg. Revenue Growth (FY2023-25)	4.8 %	4.5 %	4.6%	35.6%
10. EBITDA Margin (FY 2025)	25- 30%.	22–25%.	16 -18 %	56.5%

***Source**: Frost & Sullivan **Analysis.** Data related to Leap is for FY 2025, Exchange rates used for conversion: FY 2023- INR 82.22, FY2024 – INR 83.37, FY2025- INR 85.58*

Figure 8.2: Competitive Environment: Pallet Pooling Market, Global, CY 2024

Category	PECO	IPP	iGPS	Faber Group
I Operational Analysis				
1. Company Background	Founded in 1997. HQ Itasca, IL (U.S.) with offices in Canada & Mexico.	Founded 1988, HQ Netherlands; part of Faber Group.	Founded 2006, HQ USA; focus on plastic pallet pooling.	Founded 1891, HQ Netherlands; part of Faber Group.
2. Footprint & Industries	Grocery, CPG, food & beverage, big box & club retailers	FMCG, food & beverage, retail.	Grocery, FMCG, food & beverage.	FMCG, retail, industrial, logistics
3. Market Share in Focus Geography	3.3% NA	2.4% Europe	2.5% NA	5.6% Europe
4. Product Portfolio	Pallets (Block and GMA pallets).	Euro pallets	Plastic pallets, RFID-enabled.	Pallets
5. Customer Retention	89%	90%	90%.	90%
6. Revenue Split by Geography	100 % North America	100% Europe	100% North America	100% Europe
7. Units in Circulation	Over 20 million pallets	16 million pallets	15 million pallets	Over 38 million
II Financial Analysis in USD Million				
8. Revenue (FY 2023)	USD 176 million	USD 170 million	USD 120 million	USD 320 million
(FY 2025)	USD 190 million	USD 185 million	USD 135 million	USD 350 million
9. Avg. Revenue Growth (FY2023-25)	3.9 %.	7.4 %.	6.0 %.	4.9%
10. EBITDA Margin (FY 2025)	20–30%	12–14%	12–15%	12–15%

***Source**: Frost and Sullivan Analysis. Note: Faber Group includes - PRS, PAKi Logistics, vPOOL SATIM (Timber Supply) and Faber LAB (Technology Solutions).*

8.3 COMPETITIVE LANDSCAPE - MHE POOLING SERVICES (INDIA)

The Material Handling Equipment (MHE) pooling market in India is currently estimated at approximately 6.1 million units and is projected to grow at a CAGR of around 22.8% over the next five years. The sector is gradually consolidating, with organized players commanding ~60% market share due to their national service networks, strong brand equity, and operational consistency.

Market Composition

Offerings include a wide range of equipment-forklifts (diesel, LPG, electric), electric stackers, pallet trucks, reach trucks, trolleys, conveyors, and cranes. While around 4 large, organized players dominate key industrial regions, these players collectively command nearly 60% of the market share.

Competitive Landscape

The market's price sensitivity and low switching costs have driven the adoption of flexible options such as short- and long-termpooling, as well as financing through lease or loan partnerships. These models make pooling solutions more appealing by lowering upfront expenses and encouraging cost-conscious customers to commit for longer periods. Key Industry Participants- Large national players like TARON (Leap), Godrej RenTRUST, SFS Equipment have established a solid footprint due to their scale, diversified fleet, and long-term service. International players like Jungheinrich, KION India, and Toyota Material Handling India are expanding rapidly, offering advanced technology, automation readiness, and premium electric equipment solutions tailored to India's fast-growing warehousing and intralogistics sectors. Differentiators include Annual Maintenance Contract AMCs and value-added services, IoT-based fleet tracking, safety features with customized attachments.

Barriers to Entry

- **Value-Added Services:** Established players offer AMC packages, on-site maintenance, and 24/7 service response, creating high customer dependency and making it difficult for new entrants to compete.
- **Technology Integration:** Advanced IoT-based fleet tracking, telematics, and predictive analytics require significant investment, limiting access for smaller or new providers.
- **Customized Attachments:** Existing providers deliver application-specific forklifts, safety innovations, and adaptive controls, setting high product development standards for new entrants.
- **Automation Readiness:** Integration with semi- or fully automated warehouses demands specialized expertise and infrastructure, posing a challenge for newcomers.
- **Financing Flexibility:** Well-established pooling and hybrid ownership models tailored to customer cashflows create strong customer loyalty, raising the switching barrier for new entrants.

Key Players in MHE Pooling

Godrej RenTRUST: India's largest organized MHE Pooling provider with forklifts, stackers, cranes, and pallet trucks. Competitive advantage lies in in-house lithium-ion powered forklifts, AMC support, IoT-based fleet tracking, operator training, extensive nationwide service network, and customized safety solutions for FMCG, logistics, and manufacturing.

TARON (LEAP's subsidiary): TARON is recognized as the leading forklift pooling player and a leader in the lithium-ion segment of MHEs, having been the first to introduce these solutions in India. Leap serves over 900 clients across FMCG, auto, industrials, and logistics. TARON is the second largest forklift pooling player in India in terms of volume in Fiscal 2025. It provides a full range of lithium-ion-powered MHE, including forklifts, reach trucks, and stackers, designed for higher energy efficiency, quick charging, and lower maintenance. Its solutions, widely used in FMCG, e-commerce, and 3PL sectors, enhance warehouse productivity while reducing operating costs. With real-time fleet tracking and nationwide service support, TARON enables sustainable, technology-driven material handling.

Watrana Traction: Offers a broad range of MHE Pooling solutions including forklifts, stackers, and pallet trucks, supported by a well-stocked inventory and technical servicing. The company provides tailored pooling support for logistics, manufacturing, and warehousing operations, with a focus on quick deployment and equipment reliability.

Jungheinrich India: Focuses on automation-ready warehouse MHE solutions including electric forklifts, telematics, high-density racking, and pallet shuttles. Known for precision equipment, automation consulting, lithium-ion technology, and warehouse optimization for 3PL, e-commerce, and manufacturing clients.

8.4 Key Player Profiles of MHE Pooling (India)

Figure 8.3 highlights leading players and the competitive structure of India's MHE Pooling market in FY 2025.

Figure 8.3: Competitive Environment: MHE Pooling, India, FY 2025

Category	Godrej RenTRUST	TARON (LEAP)	Jungheinrich India	Watrana Traction
I Operational Analysis				
1. Company Background	Founded in 2013; part of Godrej & Boyce; largest Indian MHE Pooling business	Founded in 2018; one of the India's leading MHE Pooling services & fleet outsourcing player	India arm of global forklift leader, established in 2007	Founded 2003; privately held; engaged in importing, and servicing forklifts, pallet trucks, and rentals.
2. Footprint & Industries	FMCG, e-commerce, logistics, industrial, 3PL, shipping	FMCG, 3PL, E commerce, Logistics, Food & Automotive	FMCG, 3PL, auto, retail, warehouse logistics	Material-handling, manufacturing, logistics, and automotive sectors.
3. Primary geographies Catered	Pan-India depot and service network	Pan- India service network	Metro cities & pan India network	North India, (Delhi and Greater Noida)
4. Market share (Domestic)	29.5%	27.5%	13.1 %	11.4%
5. Customer Retention	80 %	85 %	82%	75%
6. Assets & products	Forklifts, stackers, cranes, material handling attachments	Lithium-ion forklifts and electric material handling	Forklifts, stackers, warranty/after-sales support	Forklifts, stackers, pallet trucks, battery MHE, traction batteries, and AMC support
7. Asset Scale (MHE Units)	1,800	1,680	800	700
II Financial Analysis in USD Million				
8. Revenue (FY 2023)	USD 8.3 million	USD 0.9 million	USD 4.6 million	USD 3.3 million
(FY 2025)	USD 10.8 million	USD 10.4 million	USD 6.1 million	USD 4.5 million
9. Avg. Revenue Growth (FY2023-25)	14.1 %	239.9%	15.2 %	16.7 %
10. EBITDA Margin (FY 2025)	21.0%	31.8 %	17.0%	18.0%

***Source**: Frost and Sullivan Analysis*

Notable Developments

- **TARON (LEAP):** Strengthened its MHE Pooling portfolio through the acquisition of SKAN Marine Services Pvt. Ltd., completed in February 2023, expanding its fleet and client base across FMCG, e-commerce, automotive, and heavy industries. Advancing the adoption of lithium-ion-powered forklifts and real-time fleet tracking to improve efficiency. Focused on offering scalable pooling models and pan-India service coverage, positioning itself as a key partner for sustainable and cost-efficient material handling.

- **Godrej RenTRUST:** Godrej RenTRUST has strengthened its position in the MHE Pooling market by investing ₹100 crore in expanding its poolingfleet and service infrastructure, as announced by Godrej & Boyce in 2023 through Rail Analysis. The company also introduced India's first lithium-ion forklift with an indigenously developed battery management system (BMS), aiming to achieve full localization of battery production by 2025, according to Business Standard in 2024.

- **Watrana Traction:** The company has reinforced its "one-stop shop" positioning in India's MHE market by expanding its product portfolio to include items such as pallet stackers, hydraulic scissor lift tables, Curtis controllers, and traction batteries. It has also enhanced inventory readiness with ample ready stock of forklifts and critical spare parts to minimize customer downtime and ensure quick turnaround.

- **Jungheinrich India:** Jungheinrich India has expanded its automation solutions with high-density storage systems, semi-automation consulting, telematics, and pallet shuttle systems. It has advanced its focus on lithium-ion forklift solutions and strengthened its local presence with the launch of a new integrated facility in Bhiwandi in 2023 to meet growing e-commerce and 3PL warehouse automation demand.

8.5 Threats and Challenges (Pooling Services - India)

The pooling industry faces a mix of external pressures and internal operational hurdles that demand strategic foresight. From volatile market forces and shifting regulations to the complexities of technology integration and reverse logistics, providers must remain agile to sustain service quality. Balancing growth ambitions with cost control, sustainability goals, and workforce readiness is critical to maintaining competitiveness in a rapidly evolving landscape. Figure 8.4 illustrates threats and challenges shaping the competitive and operational environment of India's pooling industry.

Fig 8.4: Threats and Challenges in the pooling industry

Threats	Challenges
Supply Chain Disruptions: Geopolitical tensions, port congestion, or strikes can disrupt pallet circulation and reduce availability	**Reverse Logistics Complexity:** Coordinating efficient return flows for pooled assets across dispersed geographies and multiple industries increases operational difficulty
Regulatory Uncertainty: Sudden changes in environmental, trade, or logistics regulations can increase operational costs.	**Standardization Issues:** Lack of universal specifications across customers, industries, and automation systems slows adoption and interoperability.
Economic Downturn Impact: Reduced industrial and retail activity during slow economic cycles can lower pallet utilization and demand.	**Client Onboarding Effort:** Significant time and resources are required to educate customers and integrate their operations into pooling systems.
Raw Material Price Volatility: Price fluctuations in wood, plastic, or metal can significantly impact repair and replacement costs.	**Seasonal Demand Fluctuations:** Variability in demand across seasons creates challenges in optimizing pool size and asset allocation
Asset Damage Loss and Theft Risk: Frequent asset damage, theft, or loss and inefficient reverse logistics increase costs.	**Integration Complexity:** Aligning pooling operations with diverse client ERP/WMS systems increases implementation time and risk of errors.

Source: Frost and Sullivan Analysis

8.6 Risk Factors (Pooling Services - India)

Pooling services in India face notable risk factors that could impact operational efficiency and profitability. High capital investment requirements for pallet fleets and tracking infrastructure create financial risk, especially in a price-sensitive market. Asset loss or damage due to poor retrieval rates can erode margins, while fluctuations in raw material prices affect pallet replacement costs. Dependence on a few large customers increases concentration risk, and service disruptions, caused by logistics bottlenecks, regional infrastructure gaps, or supply chain shocks—pose reliability concerns. Additionally, regulatory changes in hygiene, safety, or environmental compliance could increase operational costs and reduce competitiveness.

Figure 8.5 illustrates the key risk factors impacting pooling services in India.

Fig 8.5: Risk factors in pooling services in India

Complexities in supply chain, low awareness level, lack of standardisation, regulatory hurdles, technological progress key for the pooling services

Risk Monitorable Factors	Impact Level	Implications for Pooling Services
Awareness Level		Many SMEs are unfamiliar withpooling benefits, slowing adoption
Technology Adoption		Outdated processes limit efficiency, tracking and integration
Lack of Standardization		Variations in size and design reduce compatibility and efficiency.
Environment Policy and Sustainability		Missing guidelines affect ESG compliance and market appeal
Logistical Complexity and Poor Tracking		Retrieval difficulties cause asset loss and higher costs
Rising Raw Material Costs		Fluctuating material costs raise repair and replacement expenses
Competition from Alternatives		Low-cost options attract away price-sensitive customers

Note: Red indicates high risk, yellow moderate risk and green low risk

***Source**: Frost and Sullivan Analysis*

9 GLOSSARY

Term	Full Form	Simple Explanation
AIDC	Automatic Identification and Data Capture	Technology used to collect and process data without manual input (e.g., barcodes, RFID).
AI	Artificial Intelligence	Use of machines or software to perform tasks that require human intelligence.
AMC	Annual Maintenance Contract	A yearly service agreement for maintaining equipment or systems.
ASRS	Automated Storage and Retrieval System	A system that automatically stores and retrieves goods in warehouses.
BMS	Battery Management System	Monitors and manages the performance and safety of rechargeable batteries.
CAGR	Compound Annual Growth Rate	CAGR (Compound Annual Growth Rate) is the average yearly growth rate of an indicator (e.g. Revenue) over a period of time, assuming it grew at the same rate every year and the growth is compounded.
COD	Cash on Delivery	A payment method where the customer pays at the time of product delivery.
DBT	Direct Benefit Transfer	Direct deposit of government subsidies or benefits into citizens' bank accounts.
DFC	Dedicated Freight Corridor	A freight-only rail network for faster and more efficient goods transport.
DoC	Declaration of Conformity	A formal statement confirming a product meets required standards.
EDGE	Excellence in Design for Greater Efficiencies	Green building certification for resource-efficient construction.
EcoVadis	Ecological Value Assessment and Sustainability Rating	A global platform that evaluates companies' ESG practices and sustainability performance.
ESG	Environmental, Social, and Governance	A framework for assessing a company's ethical and sustainability practices.
ESR	Extended Storage Requirement	The need for long-term or additional warehousing capacity.
EXIM	Export-Import	Cross-border trade involving the export and import of goods and services.
FDI	Foreign Direct Investment	Investment made by a foreign company or entity into a domestic business.
FLC	Foldable Large Container	Reusable, collapsible plastic containers for bulk transport; save space during return logistics.
FSC	Forest Stewardship Council	Certification ensuring products come from responsibly managed forests.
FTA	Free Trade Agreement	An agreement between countries to reduce or eliminate trade barriers.
FTWZs	Free Trade and Warehousing Zones	Special economic zones offering tax benefits for import/export and storage activities.
GDP	Gross Domestic Product	Total market value of all goods and services produced within a country.

GMA	Grocery Manufacturers Association	A U.S. trade group that represented food, beverage, and consumer goods companies.
GVN	Global Value Networks	International supply chains linking producers, suppliers, and customers across borders.
IIP	Indian Institute of Packaging	A national apex body offering training, certification, and promotion of safe, efficient packaging standards in India.
IGBC	Indian Green Building Council	Promotes sustainable building practices through green certification.
IoT	Internet of Things	A network of connected devices that collect and exchange data in real-time.
JIS	Japanese Industrial Standards	Quality and performance standards for products used in Japan.
JIT	Just-in-Time	An inventory system that reduces holding costs by receiving goods only when needed.
MHE	Material Handling Equipment	Equipment like forklifts, pallet jacks, or conveyors used to move or store goods.
OEMs	Original Equipment Manufacturers	Companies that produce parts or equipment later marketed by another manufacturer.
PMI	Purchasing Managers' Index	Indicator of business activity in the manufacturing and services sectors.
RFID	Radio Frequency Identification	A technology that uses radio waves to track and identify objects with tags.
ROCE	Return on Capital Employed	A profitability metric that shows how efficiently capital is used to generate returns.
SPF	Spruce-Pine-Fir	A softwood group commonly used in lightweight pallet and crate manufacturing.
TAM	Total Addressable Market	The total potential revenue opportunity available in a market.
TAT	Turnaround Time	The time taken to complete a process or deliver a service.
TOC	Total Cost of Ownership	The complete cost of owning and operating an asset over its life cycle.
ULIP	Unified Logistics Interface Platform	An Indian government platform integrating logistics and transport data.
VNA	Very Narrow Aisle	A warehouse layout that maximizes storage by minimizing aisle width.
WMS	Warehouse Management System	Software that manages warehouse operations including inventory, picking, and storage.
3PL	Third-Party Logistics	3PL refers to outsourcing logistics operations—such as transportation, warehousing, distribution, inventory management, and sometimes value-added services—to an external service provider instead of handling them in-house.