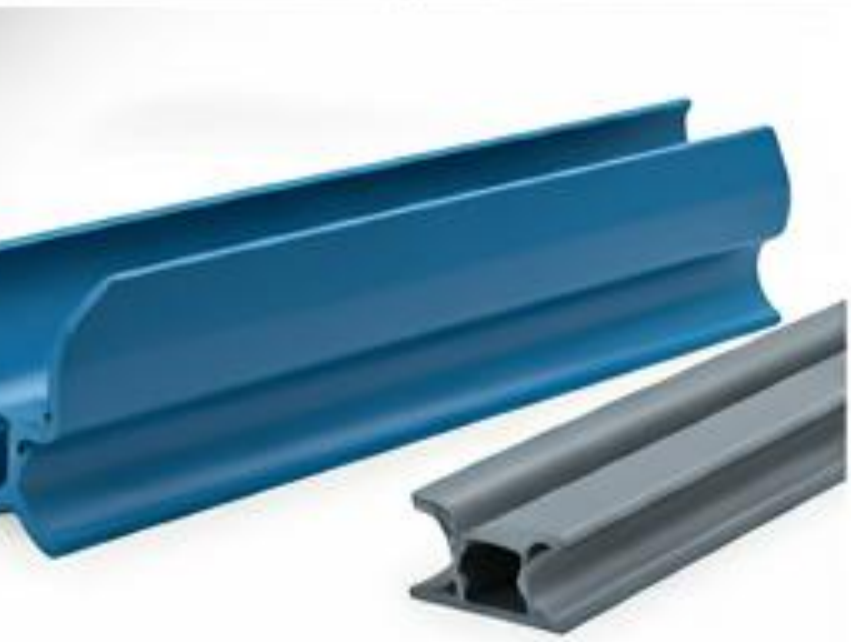

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INDUSTRY REPORT ON SELECT COMPONENTS BUSINESSES FOR THE CONSUMER DURABLES INDUSTRY

SUBMITTED TO

AJAY POLY LTD.

26th December 2024, Final Report

FROST & SULLIVAN

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1. MACROECONOMIC OVERVIEW OF GLOBAL AND INDIAN ECONOMY

1.1 Review of global economy

1.1.1. Global real GDP review and outlook

The global economy faced significant challenges in recent years, including extended trade conflicts, a slowdown in investments, and the COVID-19 pandemic, that led to a recession in CY2020. Although the economy rebounded in CY2021, new issues emerged in CY2022, such as the Russia-Ukraine war, inflation, and supply chain disruptions. By CY2023, these challenges eased, establishing global GDP growth at 3.3%. The global economy is projected to grow at 3.2% for the next two years, 3.3% in CY2026, back to 3.2% in CY2027 before moderating to 3.1% in CY2028. However, there are associated risks due to higher interest rates and reduced government spending. India has been the fastest-growing major economy since last three years, with 8.2% real GDP growth in CY2023. In contrast, the US grew by 2.9%, China by 5.2%, while Europe struggled with just 1.2% growth, affected by the ongoing war and high energy prices.

Exhibit 1.1: Real GDP Growth by Select Regions & Countries – Historic and Forecast, World, CY2018 – CY2028E

Country / Region	CY2018	CY2019	CY2020	CY2021	CY2022	CY2023	CY2024E	CY2025E	CY2026E	CY2027E	CY2028E
World	**3.6%**	**2.9%**	**-2.7%**	**6.6%**	**3.6%**	**3.3%**	**3.2%**	**3.2%**	**3.3%**	**3.2%**	**3.1%**
United States	3.0%	2.6%	-2.2%	6.1%	2.5%	2.9%	2.8%	2.2%	2.0%	2.1%	2.1%
China	6.7%	6.0%	2.2%	8.4%	3.0%	5.2%	4.8%	4.5%	4.1%	3.6%	3.4%
India	**6.5%**	**3.9%**	**-5.8%**	**9.7%**	**7.0%**	**8.2%**	**7.0%**	**6.5%**	**6.5%**	**6.5%**	**6.5%**
North America	2.8%	2.2%	-3.0%	6.0%	2.7%	2.8%	2.5%	2.1%	2.0%	2.1%	2.1%
Europe	2.3%	2.0%	-5.4%	6.4%	2.4%	1.2%	1.6%	1.6%	1.7%	1.6%	1.6%
Asia and Pacific	5.3%	4.2%	-0.8%	7.1%	4.1%	4.9%	4.5%	4.4%	4.3%	4.1%	4.0%
Middle East and Central Asia	2.7%	1.9%	-2.2%	4.4%	5.5%	2.1%	2.4%	3.9%	4.2%	3.9%	3.8%
Africa	3.4%	3.1%	-1.4%	4.7%	4.3%	3.3%	3.0%	4.2%	4.4%	4.3%	4.4%
Latin America and Caribbean	1.1%	0.2%	-6.9%	7.4%	4.2%	2.2%	2.1%	2.5%	2.7%	2.8%	2.7%

Source: IMF October 2024 forecast, Frost & Sullivan analysis

1.1.2. Inflation

Global inflation, after peaking at 8.6% in CY2022, eased to 6.7% in CY2023 and is projected to decline to 5.8% in CY2024. This decline is driven by tighter monetary policies and lower international commodity prices. Faster disinflation could ease financial conditions, while stronger reforms may boost productivity. However, new commodity price spikes or persistent inflation could prolong tight monetary policies.

Exhibit 1.2: Inflation Rate – Historic and Forecast, World, CY2018 – CY2028E

Country / Region	CY2018	CY2019	CY2020	CY2021	CY2022	CY2023	CY2024E	CY2025E	CY2026E	CY2027E	CY2028E
World	**3.6%**	**3.5%**	**3.3%**	**4.7%**	**8.6%**	**6.7%**	**5.8%**	**4.3%**	**3.6%**	**3.4%**	**3.3%**
United States	2.4%	1.8%	1.2%	4.7%	8.0%	4.1%	3.0%	1.9%	2.1%	2.1%	2.1%
China	2.1%	2.9%	2.5%	0.9%	2.0%	0.2%	0.4%	1.7%	2.0%	2.0%	2.0%
India	**3.4%**	**4.8%**	**6.2%**	**5.5%**	**6.7%**	**5.4%**	**4.4%**	**4.1%**	**4.1%**	**4.0%**	**4.0%**
North America	2.7%	2.0%	1.4%	4.7%	7.9%	4.2%	3.1%	2.0%	2.1%	2.2%	2.2%
Europe	2.2%	2.0%	1.2%	3.6%	10.0%	6.3%	3.5%	3.0%	2.5%	2.4%	2.4%
Asia and Pacific	3.1%	3.4%	3.2%	3.0%	6.3%	4.9%	4.4%	3.8%	3.4%	3.2%	3.2%
Middle East & Central Asia	9.6%	7.4%	10.3%	11.9%	13.4%	15.6%	14.6%	10.7%	8.5%	7.3%	6.6%
Africa	11.4%	9.4%	11.1%	12.3%	14.2%	18.2%	20.3%	13.9%	9.2%	8.0%	6.9%
Latin America and Caribbean	6.7%	7.6%	6.5%	9.9%	14.2%	14.8%	16.8%	8.5%	5.7%	4.4%	3.7%

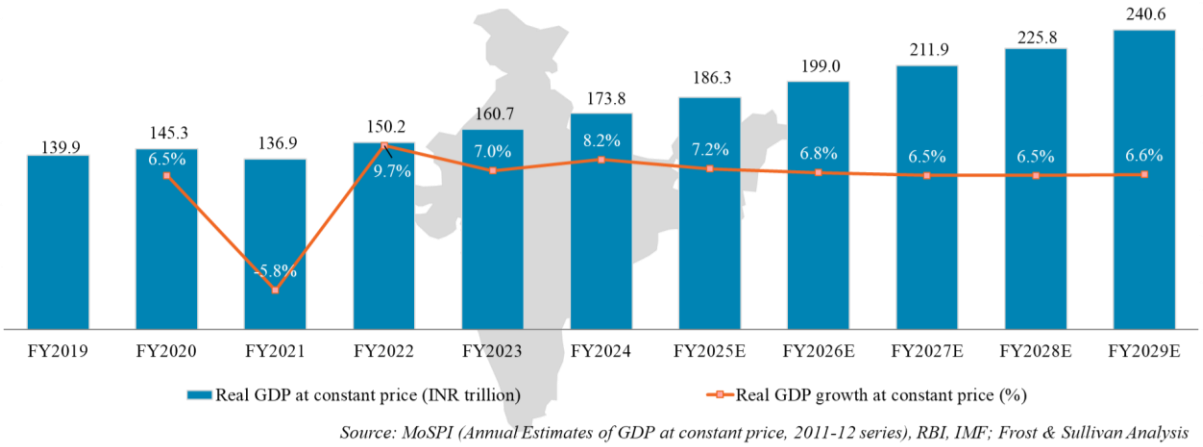
Source: IMF October 2024 forecast, Frost & Sullivan analysis

1.2 Review of Indian economy

1.2.1. Review and outlook of Real GDP growth in India

Indian economy has shown robust performance in the last three financial years and achieved 8.2% real GDP growth in FY2024, outperforming many other major economies and least impacted by the inflationary pressure globally. Structural reforms including disinvestment, increased FDI limits, and various GoI initiatives and schemes like Make In India, Production Linked Incentives (PLI), National Logistics Policy, PM Gati Shakti National Master Plan, Ease of Doing Business etc. have been introduced to bolster India's manufacturing sector after the pandemic.

Exhibit 1.3: Annual Real GDP and growth, value in INR trillion, India, FY2019 - FY2029E



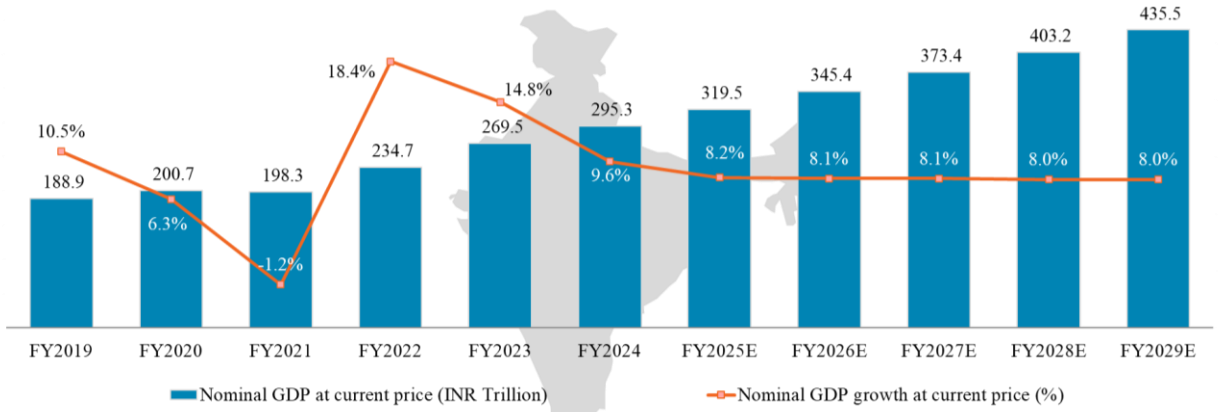
Source: MoSPI (Annual Estimates of GDP at constant price, 2011-12 series), RBI, IMF; Frost & Sullivan Analysis

India's FY2025 budget emphasizes nine key priorities aimed at achieving 'Viksit Bharat' or a 'Developed India'. These priorities include a) enhancing productivity and resilience in agriculture, b) fostering employment and skilling, c) promoting inclusive human resource development and social justice, d) boosting the manufacturing and services sectors, e) advancing urban development, f) ensuring energy security, g) investments in infrastructure, h) innovation, research and development, and i) implementation of next-generation reforms. These priorities further underscore the government's vision for sustainable growth and development across multiple sectors.

In CY2019, the Indian government set a target of becoming a USD 5 trillion economy by FY2025 however, the original timeline has been revised by 18-24 months post pandemic. India crossed USD 3 trillion mark in FY2022 and likely to surpass USD 4 trillion mark in FY2025. The country needs another 2-3 years to cross USD 5 trillion mark unless some major unseen shock happens – this would make India the third largest economy by surpassing Germany and Japan.

Macro factors contributing to economic growth include a young demographic dividend, spurring infrastructure demand due to rapid urbanization, and global supply chain shifts that present new investment opportunities. While The Reserve Bank of India's monetary policy is helping to manage inflation, the trade agreements are boosting export potential. While 'Digital India' programme is enhancing digital literacy, 'Skill India Mission' is improving workforce capabilities, and 'Make in India' programme is encouraging domestic manufacturing and foreign investments. Additionally, 500 GW of non-fossil fuel capacity by 2030, is reinforcing India's commitment to sustainability. Furthermore, expanding financial inclusion continues to empower individuals and businesses, strengthening overall economic activity. India's nominal GDP is projected to reach INR 319.5 trillion by FY2025E and INR 435.5 trillion by FY2029E, driven by recovery and infrastructure projects.

Exhibit 1.4: India - Nominal GDP and nominal GDP growth (annual percentage change), value in INR trillion, growth in %, FY2019-FY2029E

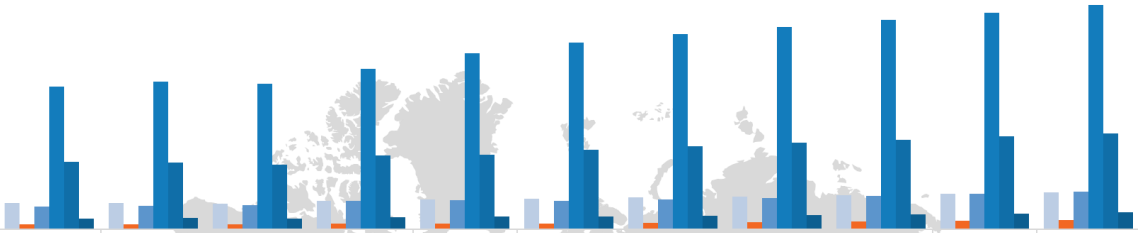


Source: MoSPI (Annual Estimates of GDP at current prices), Worldometer; Frost & Sullivan Analysis

1.2.2. Per capita income

Per capita income is a broad indicator of the prosperity of an economy. Consumer confidence and discretionary consumption improve with the rising per capita income. India's per capita income was USD 2,497 in CY2023, classifying it as lower middle-income country. The country's per capita income needs to grow to USD 6,100 for middle-income status for which equitable access to healthcare, quality educations and availability of jobs would be critical. India has significant expansion of middle-class households in the last one decade due to robust economic development, relatively slower aging, rising income levels, and urbanization – the trend is expected to continue and nearly 400 million additional middle-class and high-income population is expected to be added to the country's economy by FY2031 – this in turn would boost the per capita income of the country.

Exhibit 1.5: India vs. Global – Per capita income of India vs leading economies (USA, China, Europe and Southeast Asia), value in USD, CY2018 - CY2028E



	CY2018	CY2019	CY2020	CY2021	CY2022	CY2023	CY2024E	CY2025E	CY2026E	CY2027E	CY2028E
World	11,484	11,530	11,126	12,566	12,976	13,400	13,898	14,450	15,039	15,620	16,231
India	1,974	2,050	1,916	2,250	2,366	2,497	2,698	2,937	3,210	3,510	3,837
China	9,849	10,170	10,525	12,572	12,643	12,597	12,969	13,873	14,793	15,692	16,617
USA	63,165	65,561	64,462	71,258	77,980	82,715	86,601	89,678	92,786	96,070	99,468
Europe	29,803	29,385	28,419	32,682	32,926	35,027	36,751	38,266	39,688	41,029	42,466
SEA	4,728	4,957	4,672	5,094	5,441	5,580	5,805	6,141	6,513	6,900	7,322

World	India	China	USA	Europe	Southeast Asia (SEA)
CAGR (CY18-23): 3.1%	CAGR (CY18-23): 4.8%	CAGR (CY18-23): 5.0%	CAGR (CY18-23): 5.5%	CAGR (CY18-23): 3.3%	CAGR (CY18-23): 3.4%
CAGR (CY23-28E): 3.9%	CAGR (CY23-28E): 9.0%	CAGR (CY23-28E): 5.7%	CAGR (CY23-28E): 3.8%	CAGR (CY23-28E): 3.9%	CAGR (CY23-28E): 5.6%

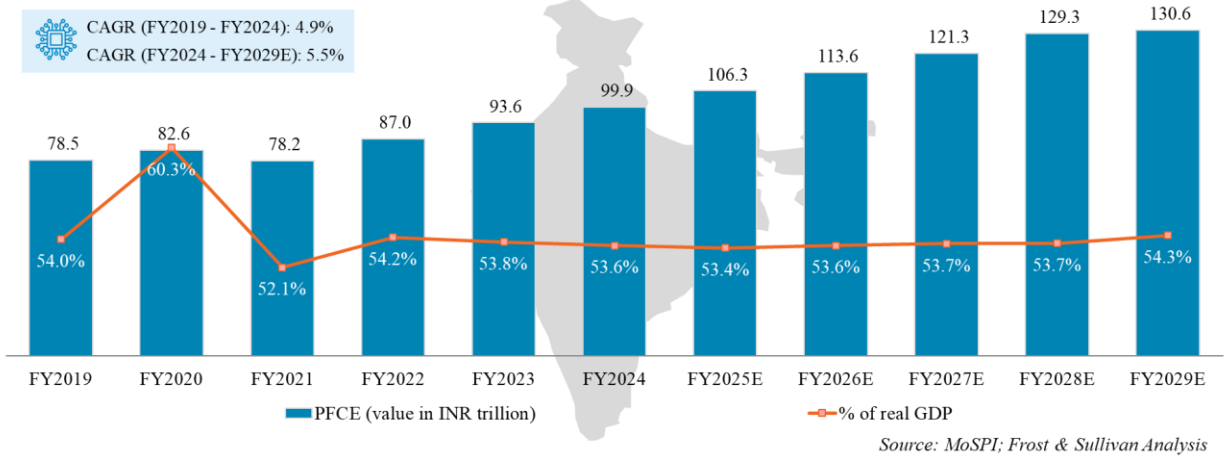
Source: IMF October 2024 Outlook; Frost & Sullivan Analysis

1.2.3. Private Final Consumption Expenditure (PFCE)

Private Final Consumption Expenditure (PFCE) refers to the spending by resident households and non-profit institutions serving households on goods and services, both within and outside the economic territory. India experienced a significant rise in disposable income in the last one decade that reshaped the consumer behaviour and expectations, with Indian consumers now more willing to spend on a wide range of products

and services, including clothing, electronics, and health and wellness products. While Indian consumers remain price-sensitive, their preferences are gradually shifting toward higher-quality offerings. This shift is fueled by accelerated urbanization, increased use of e-commerce platforms, and aspirations for an improved quality of life, influenced by global trends and exposure to digital media. Businesses are adapting to these changing market dynamics and the rise in consumerism as they seek to meet the evolving demands of this growing consumer base.

Exhibit 1.6: India – Private Final Consumption Expenditure as % of real GDP, value in INR trillion, contribution in %, FY2019-FY2029E

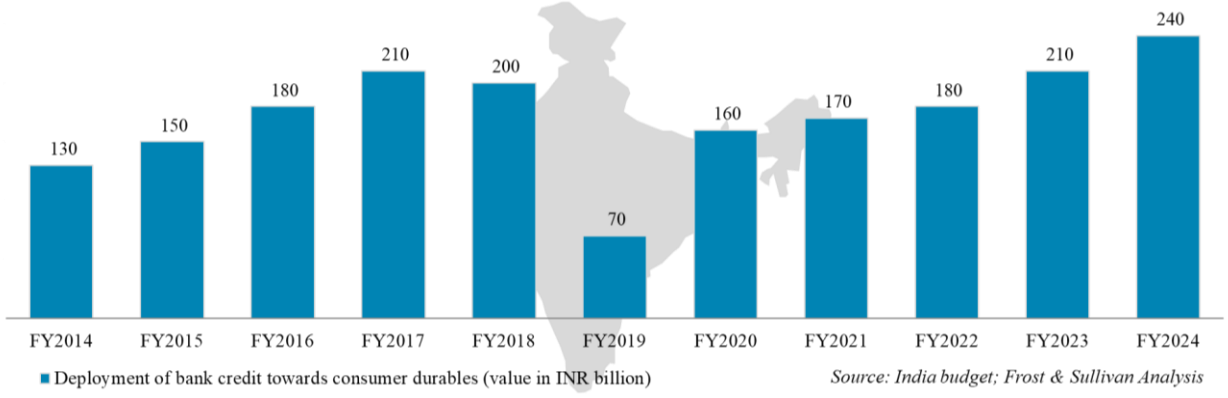


Source: MoSPI; Frost & Sullivan Analysis

1.2.4. Deployment of bank credit towards consumer durables

Between FY2014 and FY2024, bank credit for consumer durables in India grew from INR 130 billion to INR 240 billion, at a CAGR of 6.3%. After steady growth until FY2017, there was a sharp decline in the deployment of gross bank credit for consumer durables in FY2019 primarily due to economic slowdown that reduced consumer spending, rising interest rates that made loans more expensive, high levels of household debt leading to cautious spending, liquidity issues in the non-banking financial sector affecting overall credit availability and stricter lending norms from banks. Credit deployment since then recovered and grew steadily, reflecting stronger economic conditions and rising demand for consumer durables.

Exhibit 1.7: Deployment of bank credit towards Consumer Durables, value in INR Bn, FY2014 - FY2024

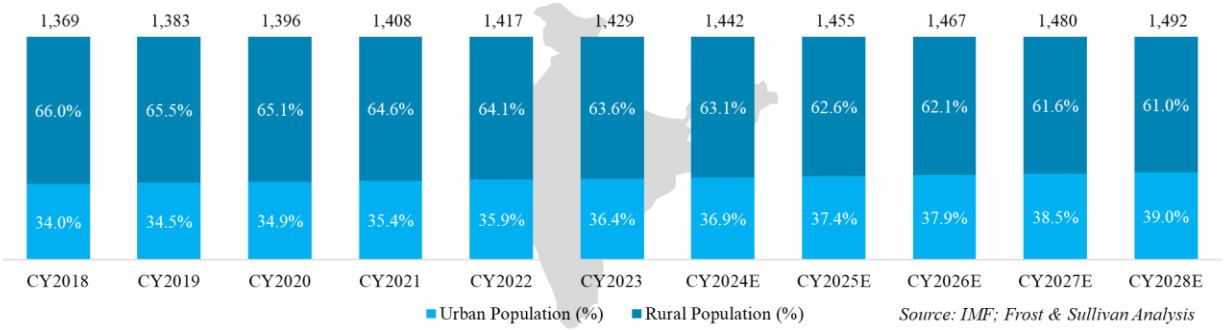


Source: India budget; Frost & Sullivan Analysis

1.2.5. Urbanisation

According to the World Bank, India became the world's most populous country in CY2022, with 1.41 billion people, accounting for 18% of the global population. The population is expected to grow at a CAGR of 0.9% between CY2023 and CY2028. Rapid urbanization led to a significant increase in urban towns and cities, driven by a better standard of living and more opportunities, resulting in greater demand for infrastructure and housing.

Exhibit 1.8: India - Population vs Urbanization, Split in %, CY2018 - CY2028E

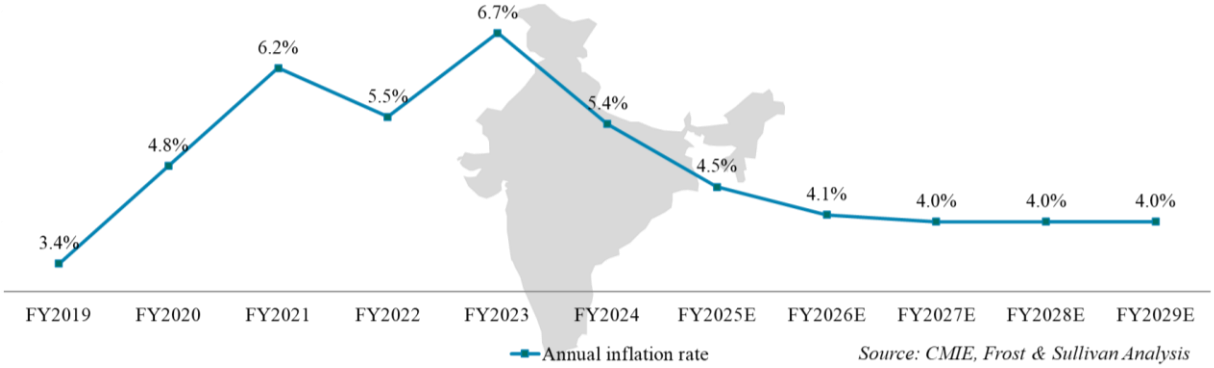


Source: IMF; Frost & Sullivan Analysis

1.2.6. Inflation

Inflation started showing an upward trend since FY2019 and increased to 6.7% in FY2023. Rising inflation emerged as a key macroeconomic concern in FY2023 with prices of almost every commodity touching new heights. However, in line with the global trend, the inflation in India moderated to 5.4% in FY2024 due to a drop in commodity prices and actions taken by RBI. The RBI left its inflation forecast for FY2025 unchanged at 4.5% even though spike in crude oil prices and persisting worries about supply chain due to the Red Sea crisis. In the medium term, RBI expects the inflation to be stabilized at around 4% by FY2029.

Exhibit 1.9: India - Annual inflation rate, rate in %, India, FY2019 - FY2029E

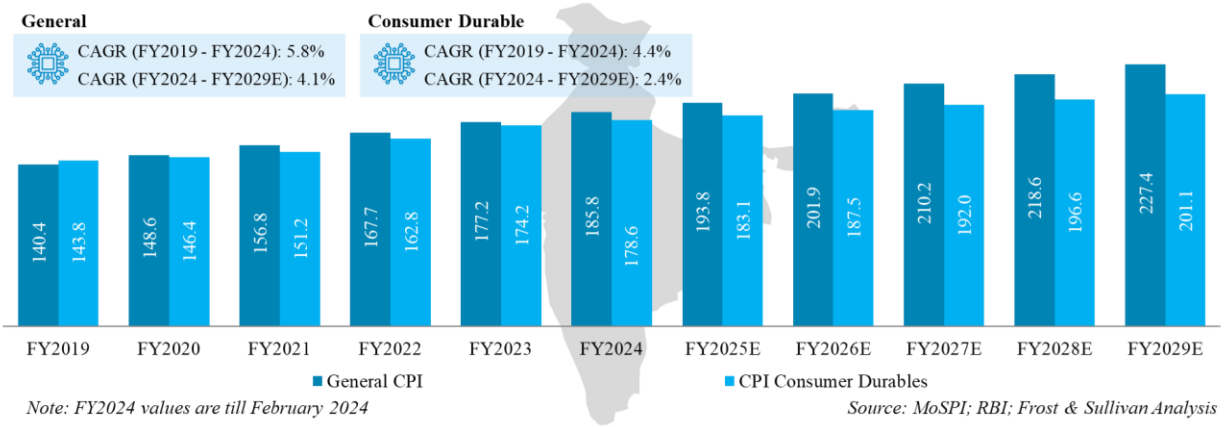


Source: CMIE, Frost & Sullivan Analysis

1.2.7. Consumer Price Index (CPI)

The Consumer Price Index (CPI) measures changes in the price level of goods and services. From FY2019 to FY2024, India's General CPI rose from 140.4 to 185.8, while the CPI for consumer durables increased from 143.8 to 178.6 growing at a CAGR of 5.8% and 4.4% respectively. This comparateively moderate price growth in the consumer durables segment benefited the companies across the value chain.

Exhibit 1.10: India – General and Consumer durables CPI, FY2019 - FY2029E



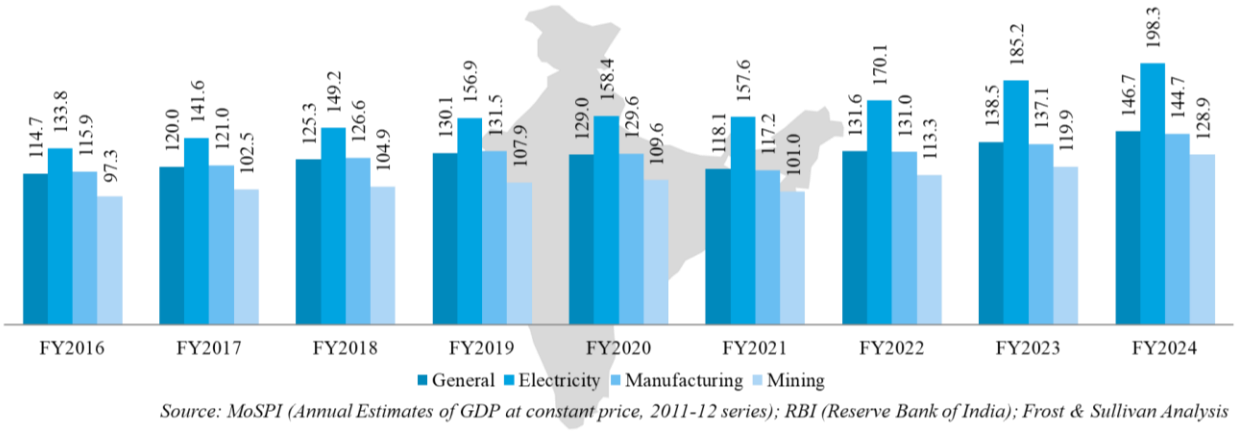
Note: FY2024 values are till February 2024

Source: MoSPI; RBI; Frost & Sullivan Analysis

1.2.8. Index of Industrial Production (IIP)

Post pandemic, since June 2021, industrial activity in the country started picking up and continued its momentum through FY2022 – FY2024 with industrial output recording a sharp growth across all the four constituent sectors in the last three consecutive years. FY2024 IIP provisional data indicates 5.5% growth for the manufacturing sector. The other three segments i.e., Mining, Electricity, and General have grown by 7.5%, 7.1%, and 5.9% respectively in FY2024.

Exhibit 1.11: India - Index of Industrial Production (IIP) by sectors, FY2016 - FY2024



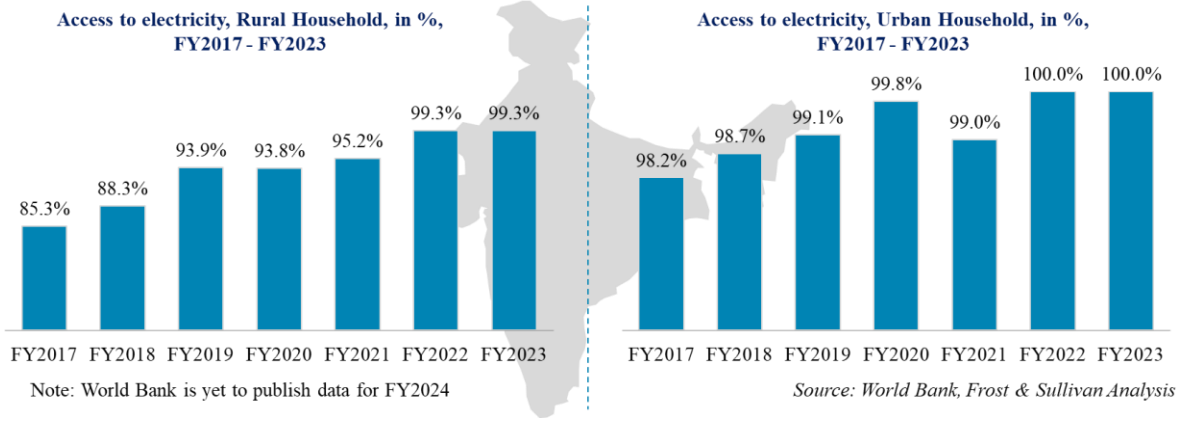
Source: MoSPI (Annual Estimates of GDP at constant price, 2011-12 series); RBI (Reserve Bank of India); Frost & Sullivan Analysis

1.2.9. Growth in household electrification in India

Power is among the most critical components of infrastructure, crucial for the economic growth, industry, and welfare of nations. The Indian government has made significant efforts over the past decades to turn the country from one with a power shortage to one with a surplus by establishing a single national grid, fortifying the distribution network, and achieving universal household electrification.

Objective of Pradhan Mantri Sahaj Bijli Har Ghar Yojana (SAUBHAGYA), launched in October 2017, along with Deen Dayal Upadhyay Gram Jyoti Yojana (DDUGJY) was to achieve universal household electrification across the length and breadth of the country. These programmes have successfully electrified 100% of urban households and 99.3% of Indian rural households at the end of FY2023 as per a report from the World Bank. The government is further supporting States for electrification of any left-out households under the ongoing scheme of Revamped Distribution Sector Scheme (RDSS). RDSS has an outlay of INR 3,038 billion with gross budgetary support of INR 976 billion from Government of India over a period of five years from FY2022 to FY2026.

Exhibit 1.12: Access to electricity, Rural vs Urban household, in %, FY2017 – FY2023



Note: World Bank is yet to publish data for FY2024

Source: World Bank, Frost & Sullivan Analysis

1.2.10. Key factors driving the growth of Indian economy

Followings are some of the key factors driving the ascent of Indian economy:

Digital competitiveness: Strong digital advantage with 900 million working-age population having affordable internet access at USD 2.5/month and 650 million smartphones that led to deeper inclusion and new demand for financial services, consumer goods, healthcare, and education. Per capita data consumption is among the highest in the world at 17 GB and e-commerce is already at 7%. Technology services exports crossed USD 150 billion in FY2022 - there are 1,500 global capability centres in India ad with 5 million employees, the sector accounts for 40% of the global technology workforce.

Strong investment in Public infrastructure: India has among the best metro airports in the world and is the third largest air traffic market having grown at a CAGR of 17% pre-Covid. Investments in airport infrastructure are providing deeper access to remote areas. Similar investments in ports, railways and highways are creating a world-class transportation network that will enable the creation of an efficient and integrated ecosystem for manufacturing, logistics and exports. The government of India has set a plan to increase port handling capacity by four times to 10,000 MTPA by 2047.

A vibrant manufacturing base: As Global supply chains are realigning, India is emerging as an alternative supply source given its raw materials, low labour costs, growing manufacturing knowhow, and entrepreneurial ability. Manufacturing sector accounts for 17% of the nations's GDP in FY2023 and employs over 27.3 million workers. Indian government introduced a few landmark policies such as PLI to share of manufacturing to 25%.

Initiatives to reduce energy import and increase country's energy security: India is working to achieve energy independence by 2047 and reduce the USD 100 billion spent annually on energy imports by increasing investments in renewable energy and green hydrogen. The government has set a goal of 500 GW of renewable capacity by 2030, requiring USD 300 billion in investments.

Stability in policy making: A stable political climate has led to consistency and predictability in policies in the last decade promoting efficiency and agility in doing business. This has instilled confidence among the global investor and resulted in steady inflow of FDI into the country.

2. GOVERNMENT REGULATIONS IN ELECTRONICS MANUFACTURING SERVICES

2.1 India emerging as a global manufacturing hub

India has established itself as a prominent contender in the global electronics manufacturing sector, attracting significant interest from multinational corporations and investors. With the world increasingly recognizing the need for diversified supply chains, India's unique advantages, coupled with favorable government policies, positions it as an attractive alternative to traditional manufacturing powerhouses like China and emerging markets like Vietnam. Several key factors underscore India's growing appeal in the electronics manufacturing landscape, as outlined below.

2.1.1. China + 1 strategy of global companies

At present, China is the world's second-largest economy and accounts for approximately 29% of the global manufacturing output. China has been the manufacturing hub of the world for decades, but the country has been gradually losing its position due to several factors. Ageing manufacturing hubs that rely on cheap labour are no longer working for China. A shrinking and ageing workforce in China implies that the country's labour-driven manufacturing expertise is fading and is facing stiff competition from other South Asian and Southeast Asian nations including India. Besides, escalating trade tensions between China and the United States have forced many global companies to diversify their supply chain and opt for the China+1 strategy. For instance, companies like Apple have aggressively expanded their operations in India – a path that many large manufacturing companies are expected to follow in the coming years.

On the other hand, India emerged as a key alternative to traditional manufacturing hubs, particularly under the global "China+1" strategy, where companies are seeking to diversify their supply chains beyond China. With its robust economic growth, increasing industrial output, and government-backed initiatives like 'Make in India' and 'Production Linked Incentive' (PLI) schemes, India presents an attractive alternative for manufacturing to the global investors. Additionally, the country offers a competitive labor market, growing domestic demand, and a large pool of skilled workforce. The strategic focus on sectors like electronics, pharmaceuticals, renewable energy components, and automotive manufacturing further reinforces India's potential as a leading global manufacturing hub.

2.1.2. Demographic dividend

The demographic dividend is a clear advantage that India has over the other leading manufacturing economies. India has the largest young workforce among its peers with an average Indian being 10 years younger than a Chinese. China's statistics bureau indicated that the country has lost 41 million workers in the last three years. China's rapidly ageing population is estimated to cross 400 million by CY2035 and is expected to pose a major threat to the country's labour-intensive economy.

The Ministry of Skill Development & Entrepreneurship (MSDE), National Skill Development Corporation (NSDC), and Sector Skill Councils (SSCs) have taken multiple initiatives including vocational training to create a technically skilled job-ready workforce to reap the benefits of demographic dividend.

Exhibit 2.1: Comparison on age of population – India vs. China, Thailand, Vietnam, and Mexico, April 2024

PARAMETERS	INDIA	CHINA	THAILAND	VIETNAM	MEXICO
Total Population (Million)	1,453.5	1,412.3	71.7	98.2	127.5
Population in age 15-64 years (Million)	960.8	974.9	49.7	67.3	85.6
Median age (Years)	27.9	38.5	39.7	32.4	29.4

Source: World Bank (Data Bank), IMF, UN (Population Data), Frost & Sullivan analysis

2.1.3. Large pool of skilled workforce

India has 593.7 million labours - the second largest in the world after China. India is the only major world economy where the supply of workforce is growing faster than demand. Every year, approximately 12 million young people reach employable age, which separates India from the other leading manufacturing economies. Besides, India's labour cost is one of the lowest in the world - The real average daily wage of India was approximately one sixth of China in CY2023 – a compelling case for the major companies to explore cheaper manufacturing destinations such as India, Thailand, Vietnam, etc. Furthermore, India produces a substantial number of engineers and technical graduates each year, ensuring a steady supply of skilled labor tailored to the electronics sector.

Exhibit 2.2: Comparison on key labour market parameters – India vs. China, Thailand, Vietnam, and Mexico, April 2024

PARAMETERS	INDIA	CHINA	THAILAND	VIETNAM	MEXICO
Total Labour Force (Million)	593.7	779.2	40.8	56.1	60.0
Labour force participation rate (% of total population)	49.9	66.4	67.1	73.0	60.4

Source: World Bank (Data Bank), IMF, ILO, Statista, Frost & Sullivan analysis

2.1.4. Improved business environment

India's business environment improved significantly in the last one decade as is evident from 'Ease of Doing Business (EoDB)' rank – from 142 in 2014 to 63 in 2019. Numerous measures across multiple economic sectors have converged towards this favourable EoDB trajectory. The Goods and Services Tax Network (GSTN) unified the country's states and UTs under one intra-national economic market system by integrating many fragmented tax systems.

Besides, to boost trade activities, significant investments have been made towards increasing the capacities of India's ports, airports, freight, railways and other critical aspects of trade-related logistics. Apart from improving the physical infrastructure, various measures like electronic sealing of containers, electronic submission of supporting documents with digital signatures, etc. have been taken to improve port operations and reduce turnaround times. Additionally, India is investing in digital infrastructure to match the logistics and telecom infrastructure of more advanced peers like China.

The 'Make in India' scheme has paid significant dividends to India's export and employment outlook. The PLI schemes in strategic industries are incentivising the expansion of Indian manufacturing and production and making the nation globally competitive. Significant growth has been observed in sectors like pharmaceuticals, heavy chemicals, and electronics. This resulted in India being the fastest growing manufacturing market globally along with Vietnam.

Exhibit 2.3: Comparison on business environment parameters – India vs. China, Thailand, Vietnam, and Mexico

PARAMETERS	INDIA	CHINA	THAILAND	VIETNAM	MEXICO
Country Risk, Geopolitical	Moderate	Moderate to High	Low to Moderate	Low to Moderate	Moderate
Manufacturing growth in % (CY2023)	~7.0	~5.0	~4.0	~7.0	~3.0
Country wise PMI (April 2024)	56.5	49.3	50.4	47.3	47.3
Gross Fixed Capital Formation (USD Bn)*	1,100	7,490	118	126	437

*GFCF data for India, Thailand, and Mexico are for CY2023

Source: World Bank (Data Bank), Trading Economics, Macro trends, Statista, Frost & Sullivan analysis

2.1.5. Other driving factors

Large domestic consumption base: India boasts a rapidly expanding domestic market driven by a burgeoning middle class with increasing consumption of electronic goods. This growing demand presents a substantial opportunity for manufacturers looking to tap into new markets. In contrast, China is

experiencing market saturation in certain segments, while Vietnam's overall market size is comparatively smaller. India's vast domestic market, combined with its position as a gateway to other South Asian markets, enhances its attractiveness for electronics manufacturers.

Trade agreements and global relations: India is actively pursuing bilateral and multilateral trade agreements that enhance its global trade relationships. Some notable examples include the India-Australia Comprehensive Economic Cooperation Agreement (IACEA), the India-United Kingdom Free Trade Agreement (UKFTA), and the India-Mauritius Comprehensive Economic Cooperation Agreement (IMCECCA). Additionally, India is a member of the Regional Comprehensive Economic Partnership (RCEP) and the World Trade Organization (WTO). These agreements aim to reduce tariffs, improve market access, attract foreign investment, and promote economic growth. India's strategic approach to trade positions it favourably in the global landscape, making it an attractive option for companies seeking to diversify their supply chains.

Innovation and R&D Ecosystem: Ancient India was the land for innovations and today, modern India, acting as 'Vishwa Mitra', is leveraging technology to bridge the gaps and reach new heights. Destined to be 'Viksit Bharat' by 2047, India aims to make research, innovation, and entrepreneurship the key drivers of its transformation. This emphasis on continuous improvement, coupled with India's vast pool of skilled talent, positions the country as a frontrunner in the global innovation landscape. Various programmes that are driving the innovation ecosystem of the country are Startup India, Atal Innovation Mission (AIM), The National Innovation Foundation – India (NIF), Innovation in Science Pursuit for Inspire Research (INSPIRE), Deep Tech Start-ups Ecosystem, National Education Polity 2020 (NEP 2020), etc. Due to this, many renowned global corporations are increasingly establishing Research and Development (R&D) teams and Global Technology Centers (GTCs) within the country. This is a win-win situation as Global corporations gain access to India's skilled workforce and cost advantages, while India benefits from exposure to cutting-edge research, fosters innovation within its economy, and creates high-quality jobs for its talented workforce. In conclusion, India's emergence as a hub for R&D and GTCs is a testament to the country's growing importance in the global innovation landscape.

2.2 Government policies and schemes driving manufacturing in India

The manufacturing sector of India is going through a major transformation. The Indian government has implemented several proactive measures to foster a conducive environment for manufacturing. Some of these notable initiatives are:

2.2.1. Production Linked Incentive (PLI) scheme:

'Make in India' is an initiative which was launched on 25th September 2014 to facilitate investment, foster innovation, build best in class infrastructure and make India a hub for manufacturing, design, and innovation. It was one of the unique single, vocal for local initiative that promoted India's manufacturing domain to the world. 'Make in India' initiative is not the state/district/city/area specific initiative, rather it is being implemented all over the country.

2.2.2. Production Linked Incentive (PLI) scheme:

Keeping in view India's vision of becoming 'Atmanirbhar', PLI schemes for 15 key sectors / product baskets with an incentive outlay of INR 2,130 billion are under implementation to enhance India's manufacturing capabilities and exports. PLI scheme across these key specific sectors started to make Indian manufacturers globally competitive, attract investment in the areas of core competency and cutting-edge technology, ensure efficiencies, create economies of scale, enhance exports and make India an integral part of the global value chain.

Based on a report from PIB, PLI schemes witnessed over INR 1,030 billion investment till November 2023, which led to production / sales of INR 8,610 billion and employment generation (direct & indirect) of over 678 thousands. PLI Schemes have witnessed exports surpassing INR 3,200 billion, with significant contributions from sectors such as Large-Scale Electronics Manufacturing, Pharmaceuticals, Food Processing, and Telecom & Networking products.

Exhibit 2.4: Approved financial outlay under Production Linked Incentive (PLI) scheme

Sectors	Implementing Ministry/Department	Approved financial outlay over a five-year period (INR billion)
Large Scale Electronics Manufacturing	Ministry of Electronics and Information Technology	386.5
Automobiles & Auto Components	Department of Heavy Industries	259.4
High Efficiency Solar PV Modules	Ministry of New and Renewable Energy	240.0
Green Hydrogen and Electrolyzer	Ministry of New and Renewable Energy	174.9
Advance Chemistry Cell Batteries	NITI Aayog and Department of Heavy Industries	181.0
IT Hardware	Ministry of Electronics and Information Technology	170.0
Pharmaceuticals	Department of Pharmaceuticals	150.0
Telecom & Networking Products	Department of Telecom	122.0
Food Processing	Ministry of Food Processing Industries	109.0
Textile Products	Ministry of Textiles	106.8
Key Starting Materials/ Drugs Intermediaries, APIs	Department of Pharmaceuticals	69.4
Specialty Steel	Ministry of Steel	63.2
White Goods (Air Conditioners and LED Lights)	**Department for Promotion of Industry and Internal Trade**	**62.4**
Medical Devices	Department of Pharmaceuticals	34.2
Drone and Drone components	Department of Civil Aviation	1.2
	TOTAL	**2,130.0**

Source: DPIIT, Invest India, Frost & Sullivan Analysis

The Production Linked Incentive (PLI) scheme for white goods aims to enhance India's manufacturing capabilities for Air Conditioners (ACs) and LED lights by providing incentives of 4% to 6% on incremental sales over five years. The scheme covers 90% of the Bill of Material (BoM) for ACs and 87% for LED lights, targeting a significant increase in local value addition from 20% to 80-85%. It is expected to drive INR 2,710 billion in production and attract INR 58.9 billion in investments. Future expansions could include refrigerators and additional white goods components to further strengthen India's manufacturing ecosystem.

2.3 Key trends in Indian Electronics manufacturing sector

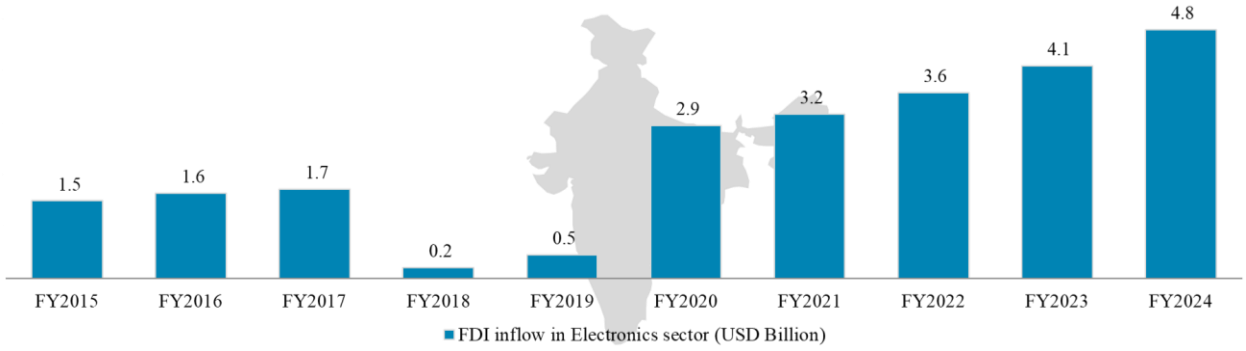
2.3.1. FDI Inflows in Indian Electronics Sector

India's electronics sector has witnessed a significant resurgence in FDI inflows since FY2019, driven by a combination of factors. Government initiatives like the National Electronics Policy and Production-Linked Incentive scheme, coupled with economic factors such as global demand and domestic market growth, have created a favorable environment for investment. Improvements in infrastructure and increased investor confidence have further fueled this positive trend. These combined factors have made India a more attractive destination for electronics manufacturers seeking to capitalize on the growing global demand for electronic products.

In FY2015, FDI inflows in the Indian electronics sector were relatively modest at USD 1.5 billion. The next couple of years saw FDI growing gradually to USD 1.7 billion before falling steeply to USD 0.2 billion and USD 0.5 billion in the next two financial years owing to a combination of economic and policy factors. Economic factors, such as a global economic downturn and domestic economic challenges, may have made investors more cautious. Policy factors, including the introduction of GST, regulatory changes, infrastructure constraints, and geopolitical tensions, could have created a less favorable investment

environment. However, driven by Govt.'s vision for the Electronics sector and attractive policies, FDI in Indian Electronics sector surged to USD 2.9 billion in FY2020, signaling renewed investor interest and confidence in India's electronics sector. The positive trend continued into FY2022, FY2023 and FY2024, with inflows rising to USD 3.6 billion, USD 4.1 billion, and USD 4.8 billion respectively.

Exhibit 2.5: India - FDI inflow in the Electronics sector, value in USD billion, FY2015 – FY2024



Source: Department for Promotion of Industry and Internal Trade (DPIIT), Frost & Sullivan analysis

2.3.2. Global companies with an established manufacturing presence in India

The table reflects a robust manufacturing ecosystem in India, with leading global brands like LG, Samsung, Panasonic, Haier, and Whirlpool having established manufacturing facilities across the country. Besides, majority of these companies have strong manufacturing capability expansion plans for India. This indicates that India is becoming a key manufacturing hub for consumer electronics and home appliances products, aligning with the government's 'Make in India' initiative.

Exhibit 2.6: Select global companies that have set up Consumer Electronics manufacturing facilities in India

COMPANY	MFG. STARTED IN	LOCATIONS	PRODUCTS MANUFACTURED	DIST. FROM APPL PLANT (APPROX.)
LG Electronics	2004	Ranjangaon, Pune	Side-by-side, Double-door, and Single-door refrigerators, LED TVs, Washing machines, ACs, and Monitors	6 kms
	1998	Greater Noida	LED TVs, Air conditioners, Washing machines, Refrigerators, and Monitors	4 kms
Samsung Electronics	1997	Noida	Mobile Phones, Refrigerators, Flat-panel TVs	13 kms
	2007	Sriperumbudur	QLED TVs & lifestyle TVs, Washing machine, Air conditioners and Refrigerators	5 kms
Panasonic	2012	Jhajjar, Haryana	Air conditioners, Refrigerators, Washing machines, Welding equipment	100 kms
Whirlpool	1996	Ranjangaon, Pune	Single door, and Double door Refrigerators	6 kms
	Late 1980's	Pondicherry	Washing machines (expanded to front load washing machines in 2022)	165 kms
	1995	Faridabad, Haryana	Single-door Refrigerators	50 kms
Haier	2022	Greater Noida	Air conditioners, Washing machines and Refrigerators	17 kms
	2007	Ranjangaon, Pune	Refrigerators, Air conditioners, Washing machines, LED TVs, Water heaters, Deep freezers	6 kms
Liebherr	2020	Aurangabad, Maharashtra	Refrigerator	190 kms
BSH	2014	Chennai, Tamil Nadu	Washing machine, Refrigerator	14 kms
Voltbek	2020	Sanand, Gujarat	Refrigerators and other appliances	9 kms
Godrej	2006	Shirwal, Pune	Refrigerator, Washing machine, Air conditioner, Chest freezer	2 kms
	1997	Mohali, Punjab	Air Conditioner, Washing machine	3 kms
Voltas- Beko	2020	Sanand, Gujarat	Refrigerators, Washing machine	9 kms

Source: Company websites; Frost & Sullivan Analysis

The Company's manufacturing units have been strategically positioned near key northern, western and southern appliance manufacturing hubs of our OEM customers, which reduces lead times and logistics costs and ensures faster and more efficient delivery. This proximity suggests potential supply chain synergies,

especially for components or raw materials that Ajay Poly supplies to these manufacturers resulting in reduced logistics costs and enhanced just-in-time manufacturing practices.

Exhibit 2.7: Select global companies and their expansion plans in India

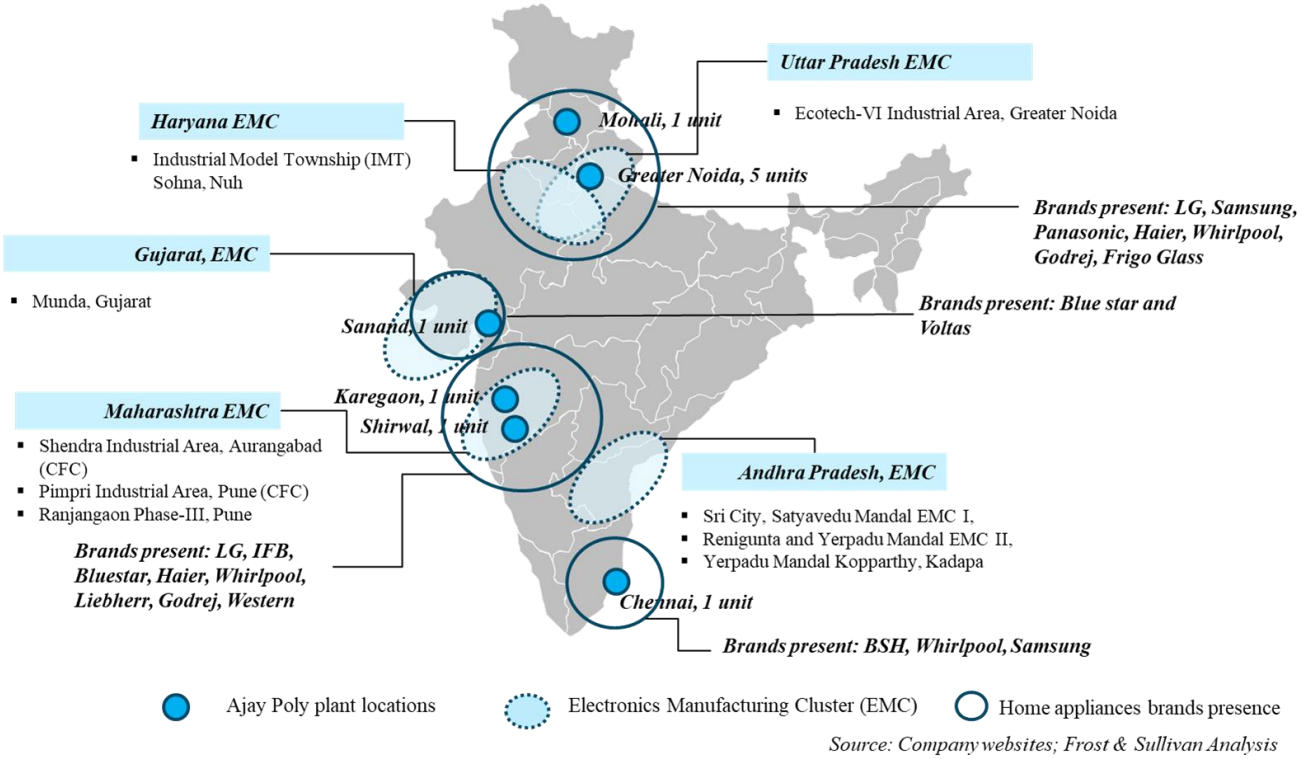
COMPANY	START YEAR	LOCATIONS	PRODUCTS	DIST. FROM APPL PLANT (APPROX.)
Hisense	2025	Sri City, Andhra Pradesh	The plant is a collaboration between Hisense and EPACK Durable Limited (EDL). It will produce air conditioners and other home appliances and is expected to start production in June 2025. The plant is expected to have a production capacity of 1 million room air conditioners (RACs) by the fiscal year 2028.	100 kms
Haier Appliances India	2025	Greater Noida	Capacity expansion plans across traditional areas such as TV, Washing machine, refrigerator, LED panels, and water heaters	17 kms
Daikin	2025	Sri City, Andhra Pradesh	Expand manufacturing capacity of compressor	100 kms

Source: Company websites; Frost & Sullivan Analysis

2.3.3. Import substitution

India's electronics imports (finished good, electronics assembly and components, solar and storage products) remained rangebound at approximate INR 4,000 billion between FY2019 and FY2021, however, surged sharply in FY2022, reaching INR 5,497 billion, largely due to the global semiconductor shortage that disrupted domestic production and increased reliance on imports. The imports further increased to INR 6,208 billion in FY2023 to support the strong growth in domestic electronics production through imports of electronics assembly and components. Imports in FY2024 grew at 17.2% to INR 7,275 billion, as import of solar components significantly increased at the later half of FY2024 before the implementation of ALMM from April 1, 2024.

Exhibit 2.8: Mapping Ajay Poly's Manufacturing Footprint and EMC Clusters in India

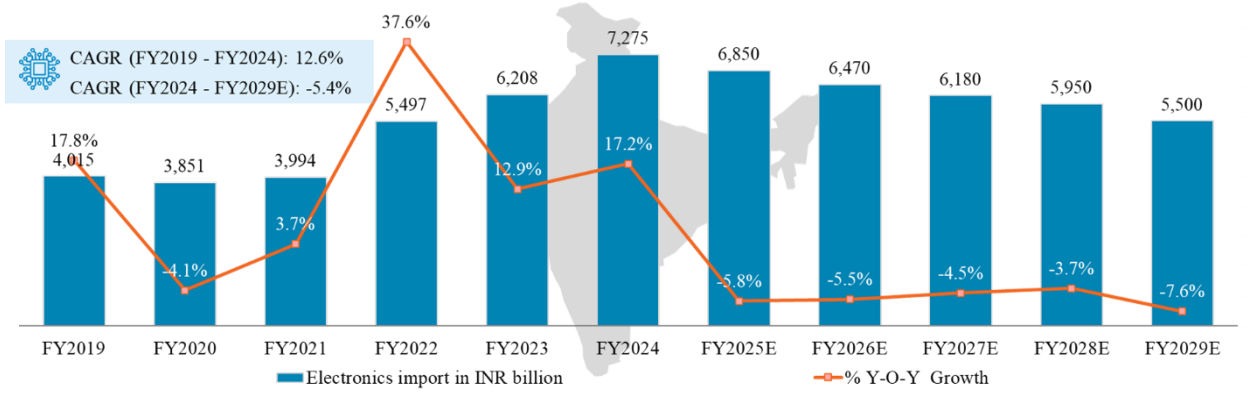


Source: Company websites; Frost & Sullivan Analysis

In order to reduce dependence on imports, the government introduced PLI schemes and is developing Electronics Manufacturing Clusters (EMCs) across the country (in places such as Mundra, Adityapur,

Mysore, etc.), providing world-class infrastructure to boost domestic production. Ajay Poly Ltd. (APL) has strategically positioned its manufacturing facilities across India, aligning closely with key Electronics Manufacturing Clusters (EMCs). The company operates five units in Greater Noida, a prominent hub for consumer electronics and mobile manufacturing. In Pune, APL has two facilities, one in Karegaon, and other in Shirwal, strategically located within the western EMC ecosystem catering to industrial and consumer electronics. Its Chennai facility is well-positioned near the Sriperumbudur and Oragadam EMCs in Tamil Nadu, while the Sanand unit in Gujarat supports the western electronics supply chain. Additionally, the Mohali unit complements northern industrial hubs. This extensive presence enables APL to support manufacturers in major EMC regions.

Exhibit 2.9: Import of Electronic products, INR billion, India, FY2019 - FY2029E



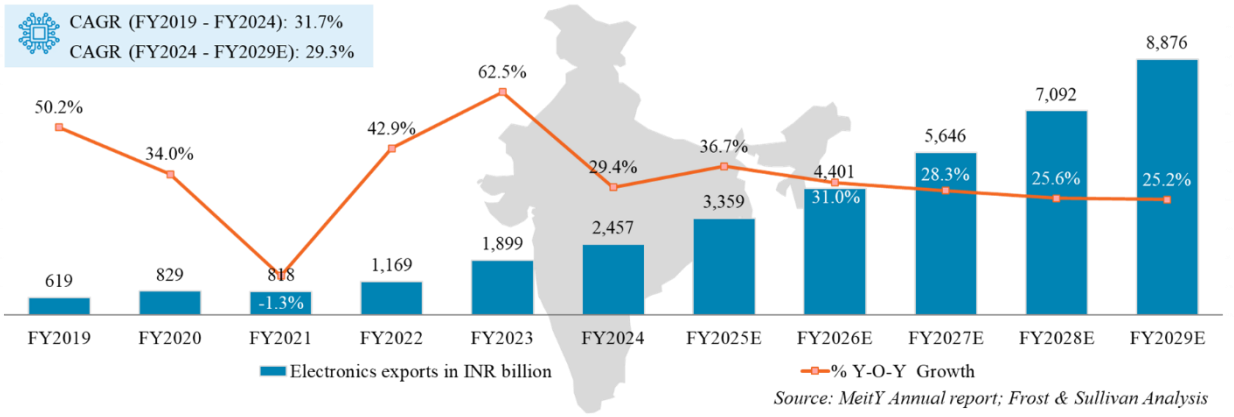
Source: Statistia, MeitY Annual report; Frost & Sullivan Analysis

The Govt. is also using various means to curb imports such as 'Phased Manufacturing Programmes' and subsequent penalties, mandatory BIS certifications, import duty and anti-dumping duties, etc. For example, Government published a long list of more than 65 products including Television, Laptops, LEDs etc. that require mandatory BIS certification, effectively restricting the import. The government also prohibited the import of air conditioners (both split and window models with refrigerants), which were previously under the 'free' import category, shifting them to the 'prohibited' category to further support domestic production. As a result, imports of electronics into the country are expected to decline from FY2025 onwards and is expected to drop to INR 5,500 billion by FY2029.

2.3.4. Growing exports

India's electronics exports have been rising steadily, driven by the China+1 strategy, strong government support through the PLI scheme, and a growing domestic manufacturing ecosystem.

Exhibit 2.10: Export of Electronic products, INR billion, India, FY2019 - FY2029E



Source: MeitY Annual report; Frost & Sullivan Analysis

Increased investments in infrastructure, skilled labor, and R&D have enabled Indian manufacturers to meet global demand, particularly for mobile phones, semiconductors, and electronic components. Favorable trade agreements and rising global demand for digital technologies like 5G and AI will further boost export growth, positioning India as a key player in the global electronics market.

As per data published by MeitY, exports of electronics products increased by almost three times between FY2019 and FY2023 - from INR 619 billion to INR 1,899 billion, at a staggering CAGR of 31.7%. The exports has reached INR 2,400 billion landmark in FY2024 which is approximately 25% of domestic electronics production. The share of exports is expected to increase further to 35% by FY2029, amouting to INR 8,876 billion.

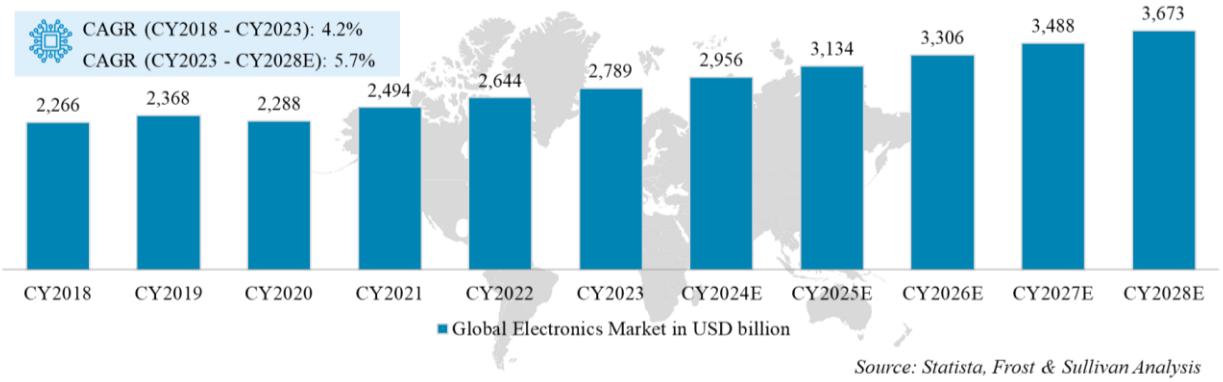
3. ASSESSMENT OF ELECTRONICS MANUFACTURING SERVICES (EMS) MARKET

3.1 Overview of global Electronics industry

3.1.1. Size of global Electronics industry

Global Electronics industry experienced substantial growth in the recent years primarily driven by the widespread adoption of electronic devices in a variety of sectors and technological advancements. The global electronics market was valued at USD 2.8 trillion in CY2023 and expected to grow to USD 3.7 trillion by CY2028. Consumer electronics, automotive, telecommunications, and healthcare are among the industries that are contributing to this robust growth. Revenue from smartphones, laptops, and wearable devices is substantial, and consumer electronics continue to be a fundamental component of this industry.

Exhibit 3.1: Size of Electronics industry, USD billion, Global, CY2018 – CY2028E



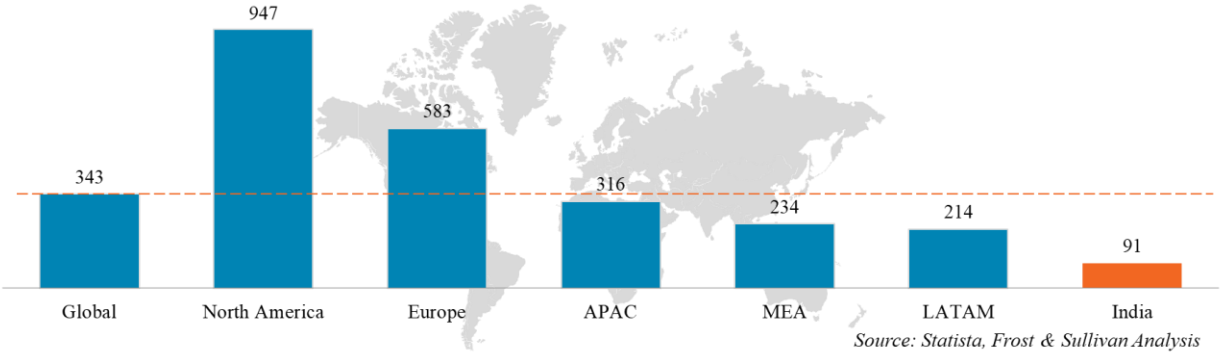
Source: Statista, Frost & Sullivan Analysis

3.1.2. Comparison of per capita electronics consumption among various regions

Globally, per capita electronic consumption is steadily increasing and is currently at USD 343. Per capita electronics consumption is the highest for North America followed by Europe. Electronics consumption in these regions are driven by the growing adoption of wireless connectivity for several electronic devices. Technological advancements, coupled with the growing popularity of wearable electronic devices, are also driving these market. Per capita consumption of electronics for APAC, MEA, and Latam regions are modest and at 316, 234, and 214 respectively.

India has one of the lowest electronics consumption among the major economies and is currently at USD 91, approximately 1/4th of the global average. Electronics consumption in the country however has grown at 8.2% CAGR between FY2019 and FY2024 due to factors such as such as increased disposable income, growing urbanization and middle-class population, ease of financing, emergence of e-commerce platforms, technological advancements etc.

Exhibit 3.2: Per capita electronics consumption, in USD, Region-wise, CY2023

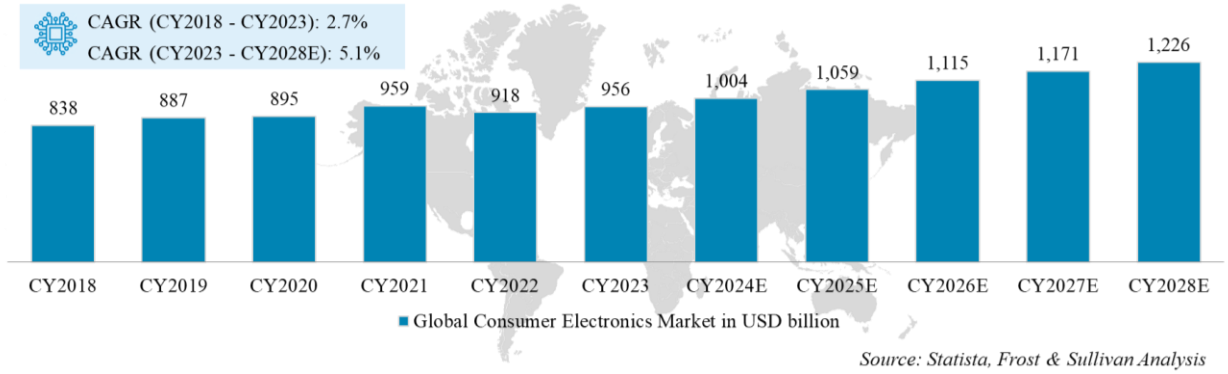


Source: Statista, Frost & Sullivan Analysis

3.1.3. Growth in global Consumer Electronics market

The global consumer electronics market size was valued at USD 956 billion in CY2023 and is expected to reach to USD 1,226 billion by CY2029, growing at 5.1% CAGR. Smartphone and computer proliferation will continue to fuel the global market for consumer electronics. The industry has evolved significantly over the last few years owing to several new technological developments. Technological proliferation, emergence of smart devices and growing urbanization would be the key factors driving the demand Consumer Electronics in the coming years.

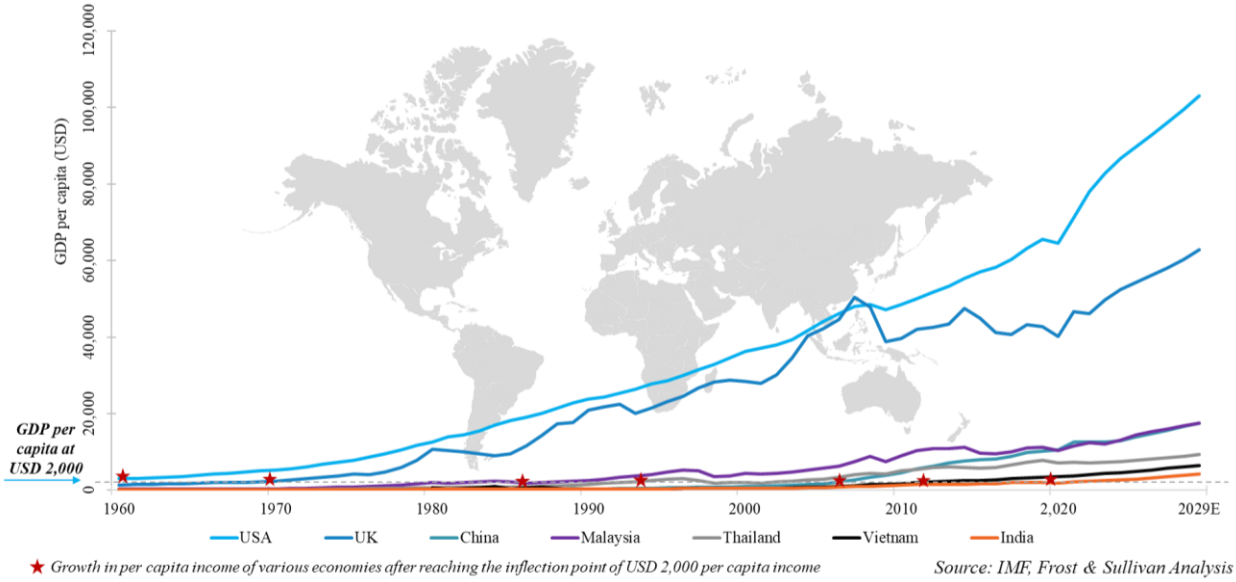
Exhibit 3.3: Size of Consumer Electronics industry, USD billion, Global, CY2018 – CY2028E



Source: Statista, Frost & Sullivan Analysis

An interesting trend has been observed that the per capita income of most of the economies grows at a faster pace after reaching the inflection point of USD 2,000. The USA and UK reached this mark between 1950 and 1970, while Malaysia reached the mark in 1986, Thailand in 1994, China in 2007 and Vietnam in 2012. It has been observed that this event generally has a positive effect on the Consumer Electronics market. With higher income levels, consumers often aspire to upgrade their lifestyles and seek improved living standards. They tend to invest in products that offer convenience, comfort, and enhanced features, such as high-end electronics, home appliances, and luxury goods. India reached this important milestone of USD 2,000 per capita income in CY2019 and has the potential to achieve USD 10,000 per capita income or a USD 20 trillion economy by the year 2047 if it manages to accomplish a sustained growth rate of 7–7.5%.

Exhibit 3.4: India vs. select developed and developing economies, per capita income after reaching the inflection point of USD 2000, CY1960-CY2029E



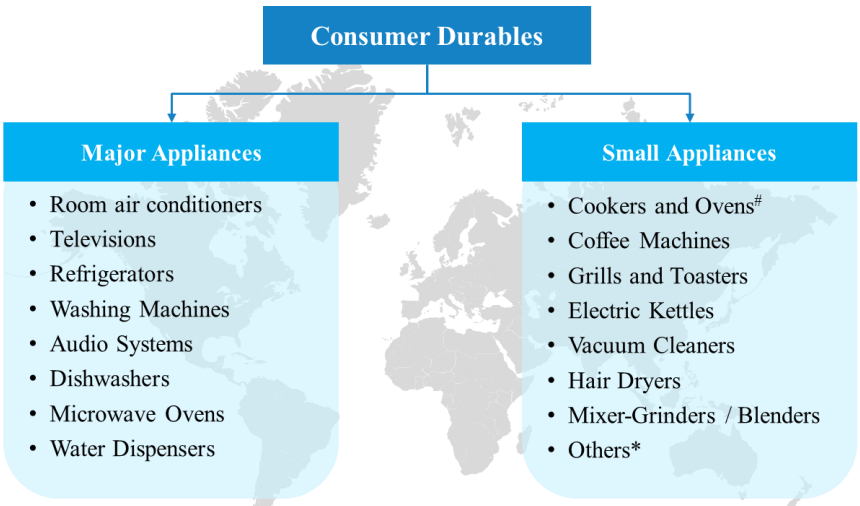
★ *Growth in per capita income of various economies after reaching the inflection point of USD 2,000 per capita income*

Source: IMF, Frost & Sullivan Analysis

3.2 Overview of global Consumer Durables market

The global consumer durables industry refers to the sector that produces and sells durable goods meant for personal and household use. Consumer durables are long-lasting products that are intended to be used over an extended period, typically lasting for several years. The industry covers a broad range of items such as Room air conditioners, Refrigerators, Televisions, Washing Machines, Audio Systems, Microwaves alongside smaller home and kitchen appliances like Induction cooktops, Dishwashers, Coffee Machines, Grills and Toasters, Mixer-Grinders, Vacuum Cleaners, etc. These products play a significant role in enhancing everyday convenience and comfort within households.

Exhibit 3.5: Classification of Consumer Durable products



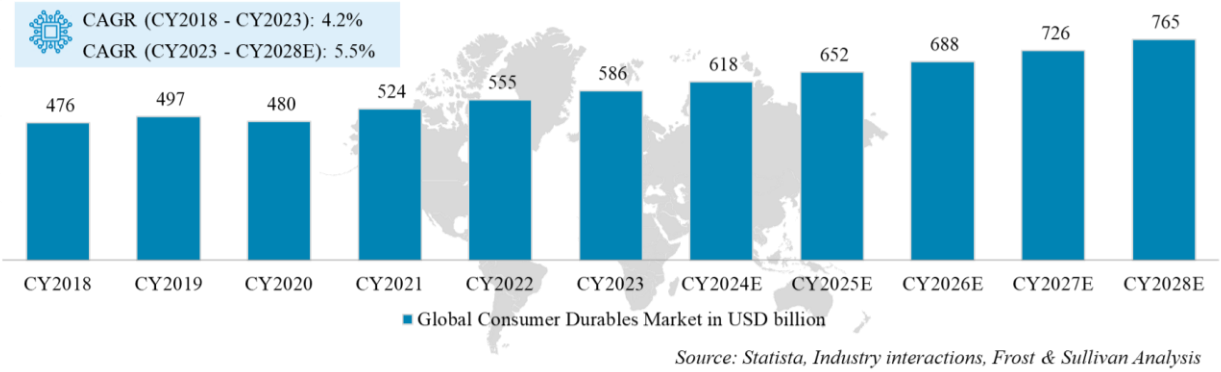
#Cookers and ovens: Induction cooktop, electric cookers, built-in ovens, cooker hoods, hobs, etc.
**Others: Personal care products, etc.*

Source: Frost & Sullivan Research and Analysis

3.2.1. Global consumer durables industry market size

The COVID-19 pandemic impacted the growth of global consumer durables market in CY2020. However, the market bounced back with lots of optimism and registered 9.0%, 6.0% and 5.5% growth in the subsequent years to reach USD 586 billion – this is despite challenges like increased inflation, Ukraine-Russia conflict, etc. Factors such as increased disposable income, growing urbanization and middle class population, ease of financing, emergence of e-commerce platforms, technological advancements etc. are driving the growth of the global consumer durables market. The market is expected to grow at 5.5% CAGR to become a USD 765 billion market by CY2028.

Exhibit 3.6: Global consumer durables industry size, USD billion, CY2018 - CY2028E



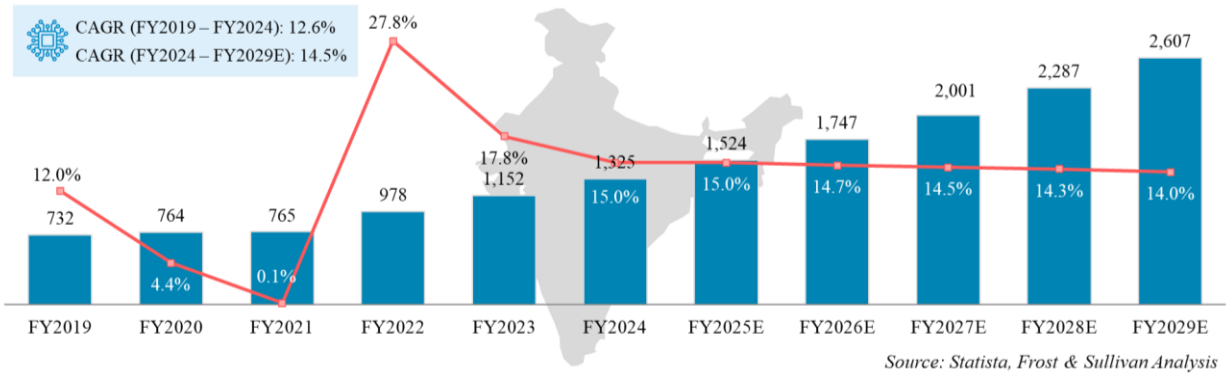
Source: Statista, Industry interactions, Frost & Sullivan Analysis

3.2.2. Indian consumer durables industry market size

Similar to Global consumer durables industry, India's consumer durables market has also undergone significant growth in the past years, driven by a multitude of factors such as developing economy, increased consumer spending power, improved access to quality products at competitive prices, etc. The market has been growing at 12.6% CAGR between FY2019 and FY2024 and reached INR 1,325 billion in FY2024. Projections indicate a robust CAGR of 14.5% through FY2029, with the market expected to expand to INR 2,607 billion by that year.

Innovative retail strategies, such as exchange programs, attractive discounts, and financing options, and emergence of e-commerce platforms have enhanced consumer purchasing power. Additionally, the focus on energy efficiency and product longevity, particularly for high-energy appliances like refrigerators and air conditioners, is driving lower operational costs and energy bills. The accelerated local production of electronic goods to meet rising domestic demand is anticipated to further strengthen the industry's supply base over the next five years.

Exhibit 3.7: Indian consumer durables market size, value in INR billion, growth in %, FY2019 – FY2029E



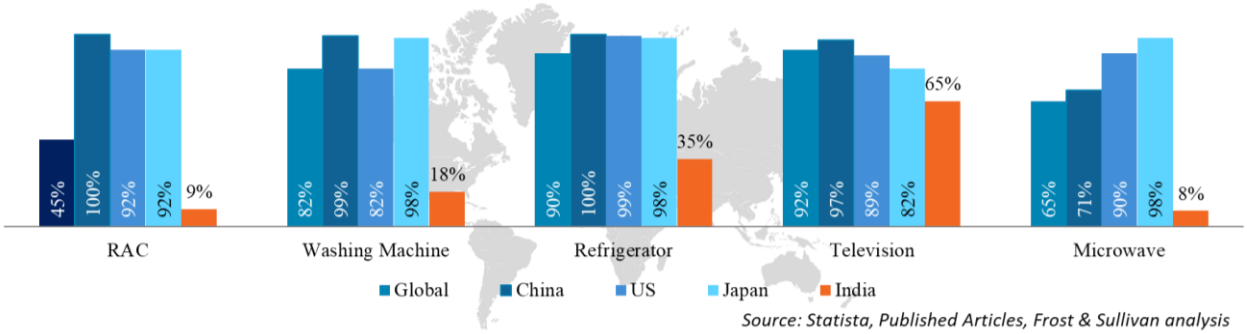
Source: Statista, Frost & Sullivan Analysis

3.2.3. Consumer durables penetration in India vs. other countries

Penetration rates for consumer durables vary across geographies due to various regional and economic factors. Developed economies have higher penetration of various consumer durable due to higher average incomes, greater purchasing power, and more mature consumer durables markets.

Television has the highest global average penetration of 92% in CY2023, followed by refrigerators and washing machines at 90% and 82%, respectively. The global penetration of room air conditioners is approximately at 45%, which is rapidly increasing due to the change in weather conditions and increasing adoption across the world. India has much lower penetration than the global average across the consumer durables category with room air conditioner and Microwave having the lowest penetrations at 9% and 8% respectively. This indicates that there is strong headroom for growth across categories in the coming years.

Exhibit 3.8: Comparison of consumer durables penetration in India vs other countries, CY2023



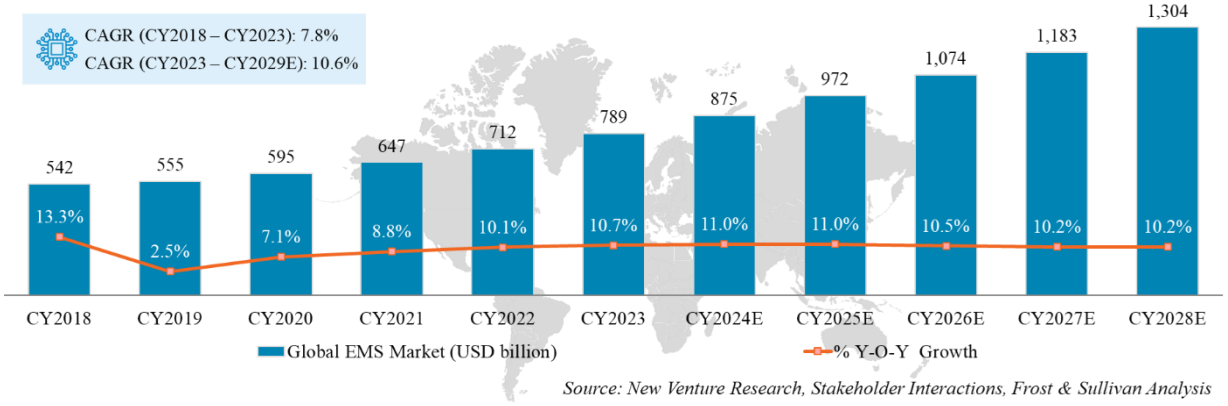
Source: Statista, Published Articles, Frost & Sullivan analysis

3.3 Overview of global Electronics Manufacturing Services (EMS) market

3.3.1. Size of global EMS market

Due to attractive value propositions such as increased production efficiency, reduced costs, faster product launch and reduction in non-core activities, the global EMS market witnessed a period of `steady growth till CY2018, riding on the wave of increased outsourcing activities from brand manufacturers and increasing electronics content. In CY2019, however, the opportunities started stagnating due to a multitude of factors such as decline in global automotive sales and saturation of consumer electronic sales. Besides, supply chain restrictions due to heightened trade tensions between US and China, followed by the pandemic in the end of 2019 affected the global EMS market significantly during this period – the supply chain glut eased subsequently however continued till the beginning of CY2023. The market is now on a steady growth path and valued at USD 789 billion in CY2023 and expected to reach to USD 1,304 billion in CY2029, growing at a CAGR of 10.6%.

Exhibit 3.9: Global EMS market, value in USD billion, growth in %, CY2018 – CY2028E

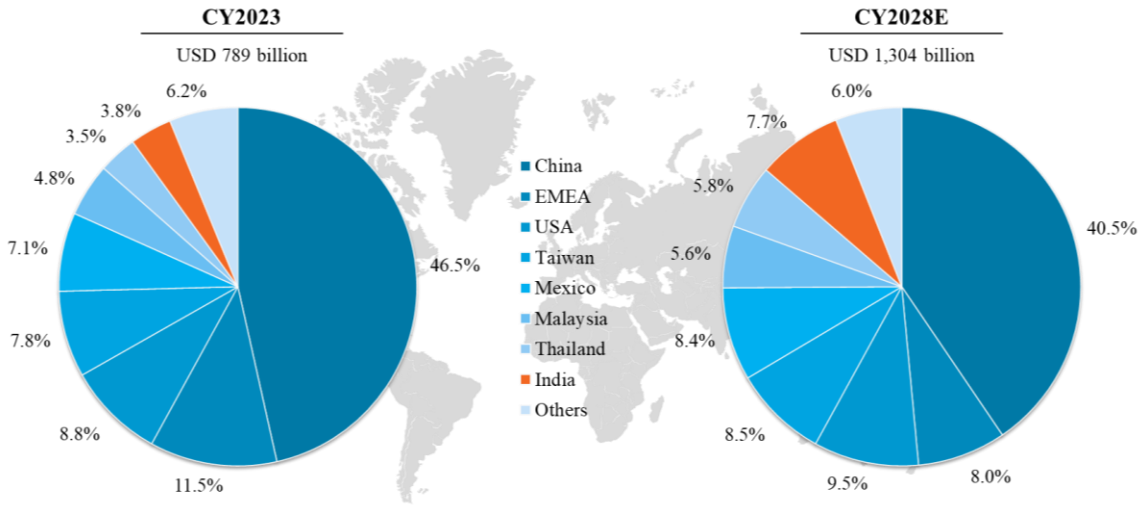


Source: New Venture Research, Stakeholder Interactions, Frost & Sullivan Analysis

3.3.2. Geographic dispersion of global EMS market

China dominates the global EMS market with 46.5% share in CY2023. However, post COVID-19, many global OEMs are resorting to China + 1 strategy, thereby looking for alternative low-cost manufacturing locations for regional manufacturing and exports. With the Indian government's focus on making India a globally competitive electronics manufacturing hub through various policy support, the country's share in the global EMS market is expected to rise from 3.8% in CY2023 to 7.7% by CY2028.

Exhibit 3.10: Global EMS market split by countries



Source: New Venture Research, Stakeholder Interactions, Frost & Sullivan Analysis

3.4 Overview of Indian EMS market

The Indian EMS industry is relatively young, with nearly three decades of experience. The industry has grown in prominence over the last decade, primarily driven by the geographical diversification by global OEMs of their manufacturing needs to reduce dependence on China and the availability of government incentives and other schemes, among others.

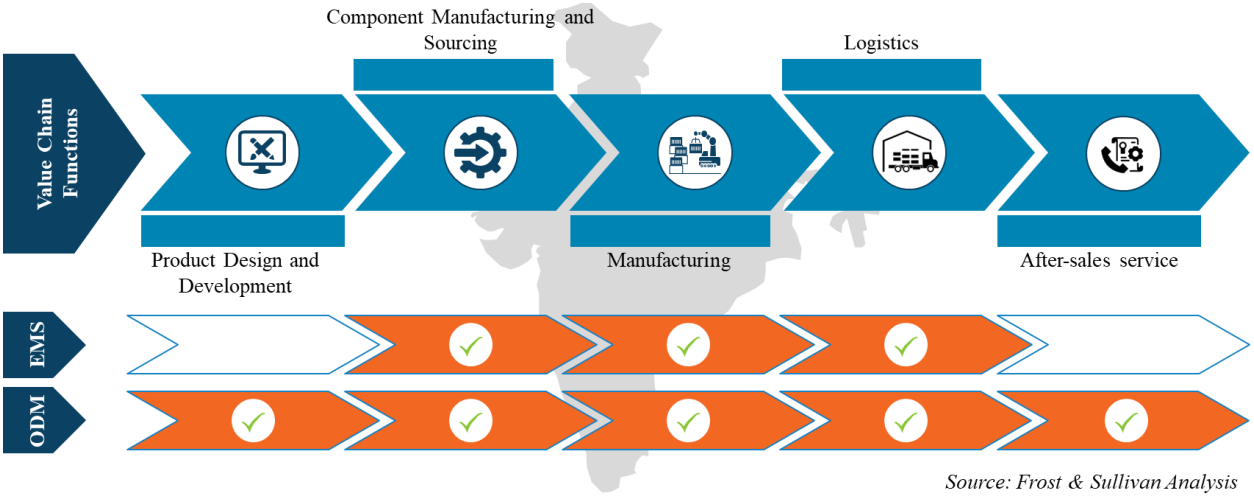
Indian EMS industry comprises of more than 700 companies, ranging from large (international and domestic), and MSMEs. Prominent large companies are some of the global EMS majors such as Foxconn (Bharat FIH), Flex, Wistron, Pegatron, Jabil, etc. and homegrown EMS companies such as Dixon, Amber, SFO, Syrma, Kaynes, Cyient, Centum, Elin, Avalon etc. As global MNCs and their supply chain partners are investing in India, the Indian EMS industry is well poised to unlock its true potential. Ambitious capacity augmentation plans of indigenous EMS players to capitalise on favourable government policies will drive growth of the Indian EMS industry in coming years.

3.4.1. Business models of Indian EMS companies

Two business models are widely followed by the large and medium EMS companies in India – ODM and EMS model. Under ODM model, EMS companies (often refer them as OEMs / ODMs) design products as per the specifications provided by the brands. EMS companies then source components, carry out fabrication and assembly, test the final product, and also undertake logistics and after sales services related activities. ODM model helps the EMS companies to have deeper and long-term business relations with the OEMs. This is a high margin business and comes at a premium for good designs.

On the other hand, under EMS model, which is currently widely followed in India, brands / OEMs provide designs and specifications to the EMS companies. EMS companies source components, manufacture / assemble components, and supply the finished products back to brands / OEMs.

Exhibit 3.11: Business models of Indian EMS companies



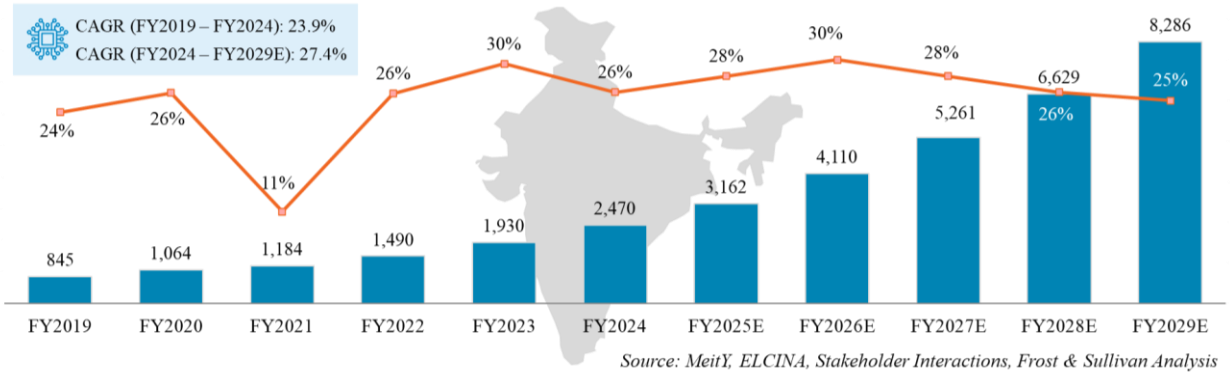
Source: Frost & Sullivan Analysis

Increasingly, Indian EMS companies are moving beyond traditional contract manufacturing activities and offering comprehensive design services, benefiting both EMS companies and brands by enhancing profit margins and allowing brands to concentrate on core activities such as innovation, brand development, sales and marketing, etc. Besides, with higher volume, and catering to multiple brands / OEMs, the EMS companies can enjoy the economies of scale, leading to improved margins or lower prices offered to brands / OEMs or both. Additionally, with increase in demand, EMS companies are likely to invest in a localized component ecosystem, bolstering domestic sourcing and competitiveness in the domestic electronics manufacturing industry.

3.4.2. Size of Indian EMS market

The Indian EMS market is valued at INR 2,470 billion in FY2024 and is projected to grow at a CAGR of 27.4%, reaching INR 8,286 billion by FY2029. This growth underscores the EMS sector's crucial role in India's electronics ecosystem, driven primarily by mobile phones, consumer electronics, industrial electronics, and automotive electronics segments.

Exhibit 3.12: Indian EMS market, value in INR billion, growth in %, FY2019 – FY2029E

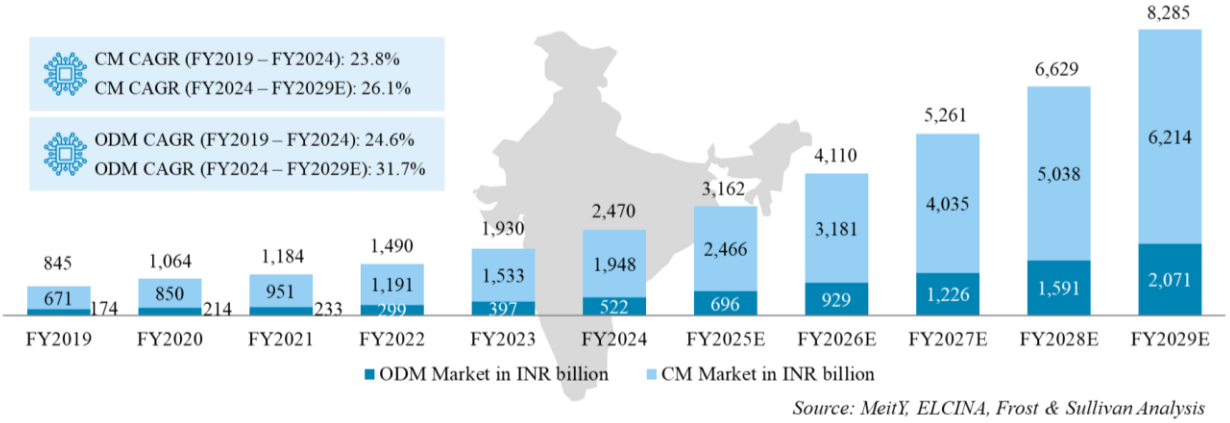


Source: MeitY, ELCINA, Stakeholder Interactions, Frost & Sullivan Analysis

3.4.3. Indian EMS market split by CM and ODM business models

In India's EMS market, contract manufacturing (CM) model dominates the market with approx. 79% share in CY2024. As reference designs and specifications are largely provided by the brands / OEMs to EMS providers, there is not much scope for product differentiation. ODM opportunities primarily exists in the entry-level products. These products have low differentiation, and the ODMs differentiate them through quality, cost and delivery. As EMS companies are steadily shifting towards ODM models, giving full turnkey solutions for items from design, product development to reverse logistics, share of ODM model is expected to increase to 25% by FY2029. Innovation is key in ODM model, with cost reduction still the main driver, alongside growing design capabilities.

Exhibit 3.13: Indian EMS market split by CM and ODM, value in INR billion, FY2019 – FY2029E



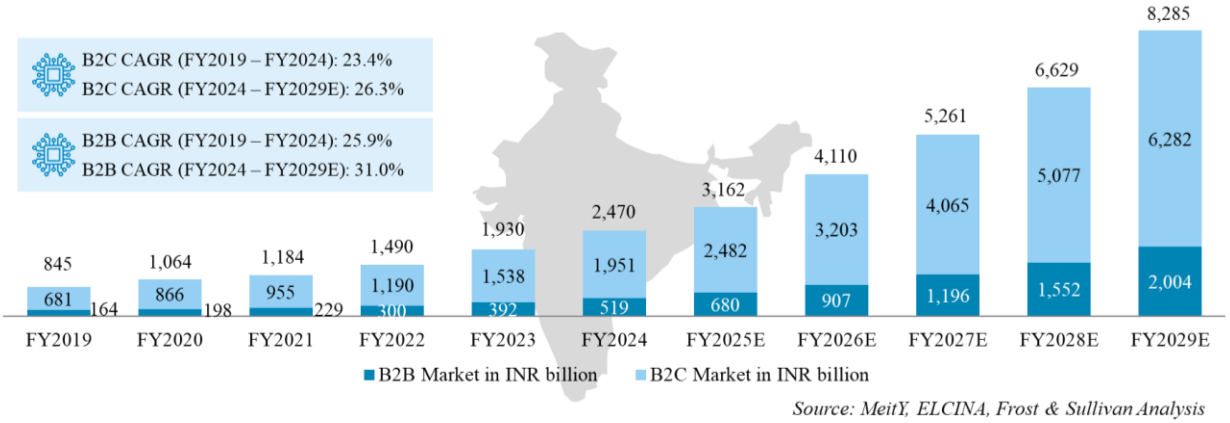
Source: MeitY, ELCINA, Frost & Sullivan Analysis

3.4.4. Indian EMS Market Split by B2B vs B2C segments

EMS market is can also be split into B2B and B2C segments. Mobile phones and Consumer Electronics (Room Air Conditioner, Washing Machines, Refrigerators, Televisions, Microwaves, Water Dispensers, Air Coolers, Kitchen Appliances, etc.), which are high volume segments are entirely B2C, whereas segments such as aerospace and defence, industrial, telecom, and medical fall under the purview of the pure-play B2B segment. Automotive, lighting, and IT segments have mix of B2B and B2C customers. Within B2C, white labelling or ODM business model is gradually becoming an important trend in the

consumer electronics segments where EMS companies are designing the entry level products and selling to the brands. In India, the B2C market was valued at INR 1,951 billion in FY2024 and is expected to maintain its dominance, reaching INR 6,282 billion by FY2029. On the other hand, B2B currently has 19% share which is expected to increase to 24% by FY2029, with the segment attaining a value of INR 2,004 billion.

Exhibit 3.14: Indian EMS market split by B2B and B2C, value in INR billion, FY2019 – FY2029E

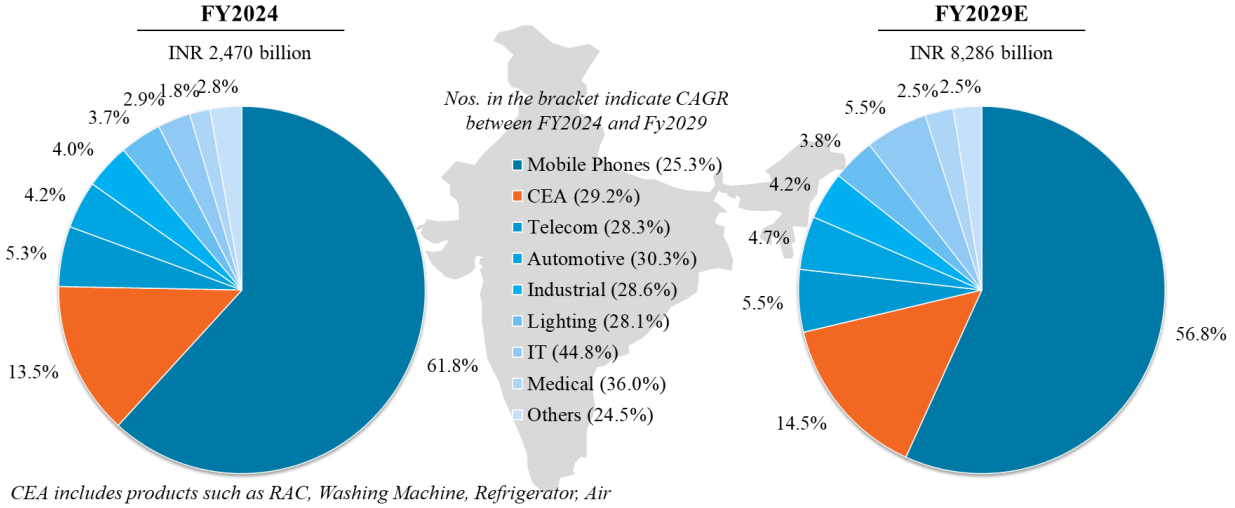


Source: MeitY, ELCINA, Frost & Sullivan Analysis

3.4.5. Indian EMS market segmentation by key end-use industries

Indian EMS industry caters to multiple end user segments such as Mobile Phones, Consumer Electronics and Appliances (CEA), Telecom, Automotive, Industrial, Lighting, IT products, Medical, and Strategic electronics. Among these industries, Mobiles Phones and CEA account for approx. 75% share in FY2024 – while Mobile Phones is expected to lose share in the coming years as EMS activities are penetrating into other segments, cumulative share of these segments would still be around 71% in FY2029. Share of CEA is expected to grow from 13.5% in FY2024 to 14.5% by FY2029, indicating a CAGR of 29.2% over the next 5 years. While EMS market across all the segments are expected to grow at 20%+ CAGR during this period, segments such as IT, Medical, and Automotive would lead the bandwagon with more than 30.0% CAGR over the next 5 years period.

Exhibit 3.15: Indian EMS market split by end-user segments, FY2024 – FY2029E



CEA includes products such as RAC, Washing Machine, Refrigerator, Air Cooler, Television, Air Cooler, Water Dispensers, Kitchen Appliances, etc.
Others: Strategic Electronics, Energy, etc.

Source: ELCINA, Stakeholder Interactions, Frost & Sullivan Analysis

Mobile Phones: The mobile phone manufacturing sector remains the largest within the Electronics Manufacturing Services (EMS) landscape in India and is experiencing significant growth. India has established itself as a major global manufacturing hub for mobile devices. The evolution of

telecommunications technology from 3G to advanced solutions like 4G, 4G+, and 5G is fundamentally reshaping data mobility in the country. The expansion of 4G technology has notably enhanced internet accessibility and increased data consumption among consumers, paving the way for future advancements in mobile communications.

Consumer Electronics & Appliances (CEA): In the consumer electronics and appliances segment, India holds a prominent position, ranking second in market share after mobile phones. The market is being driven by rising disposable incomes and rapid technological advancements, prompting consumers to upgrade to the latest products. As digital technologies and connectivity infrastructure evolve, previously untapped markets are becoming accessible, attracting consumer electronics companies. Additionally, there is a growing demand for small and kitchen appliances, which constitutes a significant portion of the overall market. To meet this rising demand for components, EMS providers and Tier-1 manufacturers are increasingly focusing on developing a robust component base domestically.

Automotive: The automotive electronics sector is poised for growth, fueled by increasing consumer awareness and rising income levels. The shift towards enhanced in-vehicle digital experiences, combined with a growing emphasis on safety features and advanced communication services, is driving demand in this market. Automakers are also expanding their offerings with more embedded connectivity solutions, which further enhances the overall automotive experience for consumers.

Industrial: Industrial electronics are essential for boosting the efficiency and productivity of various sectors. This market is expected to grow as industries such as energy, transportation, and agriculture invest in modern technologies. The focus is on integrating power conditioning technologies and power electronic devices, which include sensors, actuators, and automation equipment. As industries continue to adopt cutting-edge solutions, the role of industrial electronics in optimizing operations will become increasingly significant, contributing to the modernization of technology across various sectors.

3.5 Make In India for domestic demand & global demand

The "Make in India" initiative, launched in 2014, aims to transform India into a global manufacturing hub and boost economic growth through domestic production. This initiative is particularly pivotal for the Electronics Manufacturing Services (EMS) sector, which plays a critical role in supplying electronic components and devices for various industries. As the demand for electronics surges both domestically and internationally, the initiative seeks to enhance India's manufacturing capabilities, attract foreign investments, and foster innovation. By empowering the EMS sector, "Make in India" not only addresses local needs but also positions India as a competitive player in the global supply chain. Here’s how the initiative enhances the EMS landscape:

- **Strengthening Local Manufacturing Capabilities:** The initiative aims to elevate the EMS industry by encouraging companies to set up manufacturing facilities in India. By building local capabilities, the initiative seeks to reduce reliance on imports for electronic components and devices, ensuring a robust domestic supply chain that supports various sectors, including consumer electronics, automotive, and telecommunications.
- **Attracting Global EMS Players: "**Make in India" serves as a magnet for foreign EMS companies looking to establish operations in India. With favorable policies and incentives, global players are encouraged to invest in local production, facilitating technology transfer and best practices. This influx of expertise and resources enhances the competitiveness of the Indian EMS sector.
- **Catering to Rising Domestic Demand**: With increasing consumer demand for electronics and smart devices, the EMS sector is poised to benefit significantly. The initiative focuses on developing local

supply chains to meet this demand, enabling quicker turnaround times and customization of products. This responsiveness not only satisfies domestic consumers but also strengthens India's position as a reliable manufacturing hub.

- **Enhancing Export Potential:** By improving manufacturing standards and operational efficiencies, the EMS sector can better cater to international markets. The "Make in India" initiative aims to position India as a global sourcing destination, making Indian EMS companies more competitive in the export market. This shift can lead to a substantial increase in electronics exports, contributing positively to the nation's economy.
- **Fostering Innovation and R&D:** The initiative encourages collaboration between domestic EMS providers and global technology firms, driving innovation within the sector. Establishing research and development centers in India allows local players to develop cutting-edge solutions tailored to market needs. This focus on innovation enhances the quality and appeal of Indian-made products in both domestic and international markets.
- **Skill Development for a Competitive Workforce**: To meet the growing demands of the EMS sector, skill development is essential. The initiative promotes training programs aimed at enhancing the skill set of the workforce in electronics manufacturing. By equipping individuals with necessary technical skills, the initiative not only addresses the skill gap but also ensures a steady supply of qualified labor for the expanding EMS industry.
- **Sustainability and Green Manufacturing:** The "Make in India" initiative emphasizes the importance of sustainability in manufacturing practices. EMS companies are encouraged to adopt eco-friendly technologies and processes, reducing their environmental footprint. This commitment to sustainability resonates with global trends, making Indian EMS offerings more attractive to environmentally conscious consumers.
- **Infrastructure Development to Support EMS Growth:** The initiative includes substantial investments in infrastructure development, essential for the growth of the EMS sector. Improved logistics, transportation networks, and industrial parks create a conducive environment for manufacturing activities, allowing EMS providers to operate efficiently and effectively.

3.6 Emerging trends in EMS industry in India

- **Faster replacement cycle and high demand for emerging technologies:** Electronic products have shorter life cycles as a result of rapid technological improvement and newer products with enhanced technology. Customers are also replacing their electronics with newer products with constantly changing customer views and expectations.

  This growing preference for advanced technology products has driven rapid innovation in the consumer electronics business. Emerging technologies, for example, IoT, AI, 5G, and the introduction of robotics and analytics in the industrial and strategic electronics segment, have all led towards the overall development of numerous electronic products, which has boosted the local demand.
- **EMS companies offering design services:** EMS companies are moving up the value chain and Indian design companies work on end-to-end product development, right from concept design to development to prototype testing. Advanced product development focusing on miniaturization, IoT, automation, AI, and defence applications is likely to be one of the biggest trends in electronics design. Electronic Design Automation (EDA) is a category of software tools which drives the design of Integrated Circuits and PCBs. Until recently, EDA software tools were used to cater mainly to the semiconductor business.

However, the fast rise of AI, ML, deployment of 5G communication, edge and cloud computing have created the need for innovation in hardware, as an outcome such software tools are in very high demand.

- **Component miniaturization:** During the complete production cycle, an electronic device is being handled by a variety of manufacturing equipment. The ever-increasing complexity of electronic assemblies, as well as component miniaturization, has increased demand for advanced and dependable manufacturing equipment. The choice of PCB is dictated by three major factors from the product perspective, which is complexity of operation, form factor, and level of miniaturization.
- **After sales service as part of offerings of the EMS companies:** Repair and rework are no longer seen as non-value-added services in electronic manufacturing industry. It is increasingly becoming part of OEM and EMS/ODM service offerings. Repairing and reworking equipment allows electronic manufacturers to save valuable electronic components and semiconductors instead of discarding them. It is also being accepted in the electronics industry due to the development of precise SMT (Surface Mount Technology) repair and rework equipment. Complex, high density PCBA are simply too valuable to scrap. Due to the tight production runs of Just-In-Time manufacturing, even smaller boards with fewer components would need to be repaired.

3.7 Key growth drivers for the industry

- **Strong push towards Make in India:** India is experiencing a strong push from the government to boost domestic electronics manufacturing, especially in mobile phones, consumer electronics, IT, medical, and strategic electronics. Through the “Aatmanirbhar Bharat Abhiyaan” (Self-Reliant India campaign), the government offers a growing range of incentives to attract and localize production, encouraging both manufacturing and exports across various industries.
- **Influx of new electronic applications going forward:** New emerging opportunities like Electric Vehicles, IoT, and Electronic Security system (Cameras or Storage) are opening up new electronic market for India and these industries will also be driven by the Make in India thrust.
- **Increased electrification through various initiatives:** The Indian Government’s "Power for All" program is a significant step in this direction with the primary goal of making 24x7 power available to all households, industries, commercial businesses, public needs, and any other entity that consumes electricity. This in turn would drive the demand for electronics products.
- **Digital India initiative:** The primary objective of the program is to transform India into a digitally empowered society and knowledge-based economy. In electronics manufacturing, the Digital India initiative is offering tax incentives in focus areas like FABS, fabless design, set-top boxes, VSATs, mobiles, consumer and medical electronics, smart energy meters, smart cards, and micro-ATMs.
- **Changing geopolitical situation post-COVID:** Post-COVID, there is a far greater resistance to rely on China as the key manufacturing source for many global corporations. India is seen as one of the possible diversification areas along with Vietnam and other Southeast Asian nations.
- **Increasing financing options and no-cost EMI schemes:** In recent years, the availability of low-cost financing and no-cost EMI options has made consumer electronics more affordable for Indian consumers. Financial institutions are now reaching rural and semi-urban areas to meet financing needs. Additionally, brands are partnering with financing companies, which benefits consumers and increases brand visibility in smaller markets.

4. ASSESSMENT OF INDIAN CONSUMER DURABLES/ HOME APPLIANCES MARKET

4.1 Overview of Indian Consumer durables market

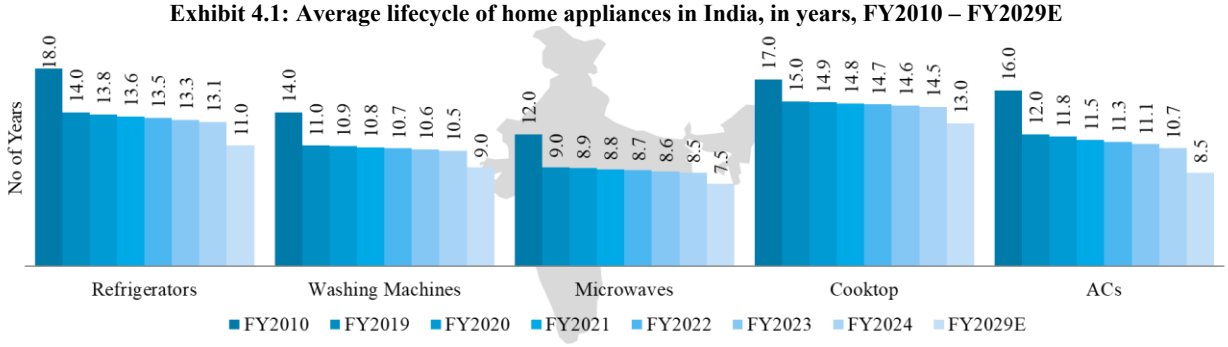
India's consumer durables market has experienced remarkable growth in recent years, fueled by several key factors, including a developing economy, rising consumer purchasing power, and broader access to quality products at competitive prices. Between FY2019 and FY2024, the market expanded at a compound annual growth rate (CAGR) of 12.6%, reaching INR 1,325 billion in FY2024. Projections suggest this growth trajectory will continue, with the market expected to achieve a robust CAGR of 14.5% through FY2029E, reaching an estimated INR 2,607 billion.

The market's growth has been driven by innovative retail strategies such as exchange programs, substantial discounts, and flexible financing options, as well as the rapid rise of e-commerce platforms, all of which have empowered consumers to make purchases more readily. Additionally, increasing attention to energy-efficient products, particularly in high-energy appliances like refrigerators and air conditioners, has appealed to cost-conscious consumers seeking long-term savings on energy bills. The growth of local production capabilities to meet domestic demand is expected to further strengthen the industry's supply chain over the next five years, reinforcing the market's expansion potential.

4.1.1. Replacement cycles of home appliances

The replacement cycle of home appliances is shortening due to technological advancements, growing energy efficiency awareness, rising disposable incomes, and changing consumer preferences. Traditionally longer, these cycles are now faster as consumers upgrade more frequently across categories like refrigerators, washing machines, microwaves, and air conditioners. Innovations and regulatory changes are driving this trend, prompting quicker replacements for modern, efficient models.

Exhibit 4.1: Average lifecycle of home appliances in India, in years, FY2010 – FY2029E



Source: Industry interactions, Frost & Sullivan Analysis

- **Refrigerators:** Historically, refrigerators had a longer lifespan, with replacement cycles averaging 18 years in FY2010. However, the introduction of energy-efficient models, modern designs, and advanced cooling technologies has reduced this cycle. As of FY2024, the average replacement cycle for refrigerators is 13.1 years and this is anticipated to drop to 11 years by FY2029E.
- **Washing Machines:** Washing machines, which had a replacement cycle of 14 years in FY2010, have also seen a reduction in lifespan. Innovations such as inverter motors, energy-saving features, and improved washing capabilities have encouraged consumers to replace their machines more frequently. The current replacement cycle has shortened to 10.5 years in many households.
- **Microwaves:** The replacement cycle for microwaves used to be around 12 years in FY2010, but this has also seen a decrease. With the growing demand for faster, smarter, and more efficient cooking appliances, consumers are now replacing microwaves within 8.5 years, driven by improvements in functionality and design.

- **Cooktops:** Cooktops, which had a replacement cycle of about 17 years in FY2010, have also experienced a shorter lifespan. The average replacement cycle for cooktops is now 14.5 years as consumers seek better cooking technologies and features.
- **Air Conditioners (ACs):** Air conditioners had a replacement cycle of 16 years in FY2010, but rising environmental concerns and advancements in cooling efficiency have led to a shorter lifespan. Today, ACs are typically replaced within 10- 11 years in FY2024.

4.1.2. Increasing demand from rural India

The demand for white goods and consumer durables in rural India is experiencing significant growth, driven by the convergence of digitalization, e-commerce expansion, rising affluence, improved infrastructure, and rural electrification. Traditionally viewed as a market dominated by urban consumers, rural India is now emerging as a key growth area for consumer goods manufacturers. With increasing access to the internet, growing disposable incomes, and greater awareness of modern appliances, rural households are now more inclined to invest in products that enhance their quality of life. This shift represents a promising opportunity for businesses, as rural consumers continue to embrace technology and aspire to improve their living standards.

Digitalization: Digital infrastructure in rural India has vastly improved, thanks to government initiatives like Digital India and the rollout of affordable internet access. With increased smartphone penetration and high-speed internet becoming more accessible, rural consumers are becoming more informed and aware of modern appliances and technology. This has spurred interest in purchasing white goods such as refrigerators, washing machines, and air conditioners that were once perceived as luxury items but are now seen as essential for improving quality of life.

E-commerce Expansion: The rise of e-commerce platforms has revolutionized retail in rural India, providing access to a wide range of products that were previously unavailable in smaller towns and villages. E-commerce giants such as Amazon and Flipkart, along with region-specific players, have expanded their delivery networks, enabling rural consumers to purchase products directly without relying on traditional brick-and-mortar stores. The convenience of home delivery, flexible payment options, and competitive pricing have further encouraged rural households to invest in consumer durables. Moreover, online marketplaces often offer discounts and financing options, making appliances more affordable for rural buyers.

Rising Affluence: Rural incomes have been gradually increasing due to improvements in agricultural productivity, government welfare schemes, and employment opportunities in non-agricultural sectors. With more disposable income, rural households are now able to spend on aspirational products like refrigerators, microwaves, and televisions. The shift from basic necessities to lifestyle-enhancing products is becoming more prominent as rural consumers look to upgrade their living standards.

Government Schemes and Electrification: The government's push for rural electrification through programs like the Deen Dayal Upadhyaya Gram Jyoti Yojana (DDUGJY) has brought reliable electricity to a vast number of rural households. As a result, rural families are now able to use electric appliances that were previously impractical. Additionally, schemes like Pradhan Mantri Awas Yojana (PMAY) that promote affordable housing have led to an increase in household formation, further driving demand for appliances.

Cultural Shift and Urban Influence: As rural areas become more connected, there has been a gradual cultural shift where rural consumers increasingly aspire to emulate urban lifestyles. Exposure to television, social media, and digital advertisements has made rural consumers more aware of the benefits of modern

appliances. This shift, combined with growing disposable incomes, has resulted in a greater willingness to purchase consumer durables that enhance comfort and convenience. Moreover, consumerism is beginning to take root in rural India, driven by factors such as rising rural incomes, improved electrification, and increased access to online retail platforms. As rural households gain access to modern conveniences, they are showing a growing appetite for appliances that improve their quality of life, reflecting a significant opportunity for market growth in these regions, has resulted in a greater willingness to purchase consumer durables that enhance comfort and convenience.

4.1.3. Growth Drivers and Market Trends

Growth drivers

- **Rising Disposable Incomes:** As India's per capita GDP continues to rise, the purchasing power of consumers is steadily improving. This has led to greater demand for consumer durables, as more households can afford to invest in high-quality appliances. A larger middle class and increased income levels fuel the growth of appliances, especially in emerging urban centres. The availability of affordable credit and financing options has significantly boosted consumer purchasing power. Retailers and financial institutions are offering easier EMI schemes and loans, making it simpler for end-consumers to purchase expensive appliances, thus driving sales across various appliance categories.
- **Accelerating urbanization:** Urbanization is rapidly expanding, particularly in Tier 2 and Tier 3 cities, where the demand for consumer durables is increasing. As more people migrate to cities for better job opportunities and living conditions, the need for modern appliances grows. Urban populations are more inclined to invest in convenience and energy-efficient home products.
- **Premiumization and efficient Appliances:** The growing demand for premium and energy-efficient appliances is reshaping the market. Consumers are increasingly willing to pay more for advanced features, such as smart technology, better energy ratings, and environmentally friendly products. This shift toward premiumization is a direct response to rising incomes and greater environmental awareness.
- **Indian EMS Players Expand business:** Indian electronics manufacturing services (EMS) players are ramping up their efforts to grow exports, strengthening their global market shares. This is driven by both domestic and international demand for quality products manufactured in India, with many Indian companies expanding their footprint in global markets.

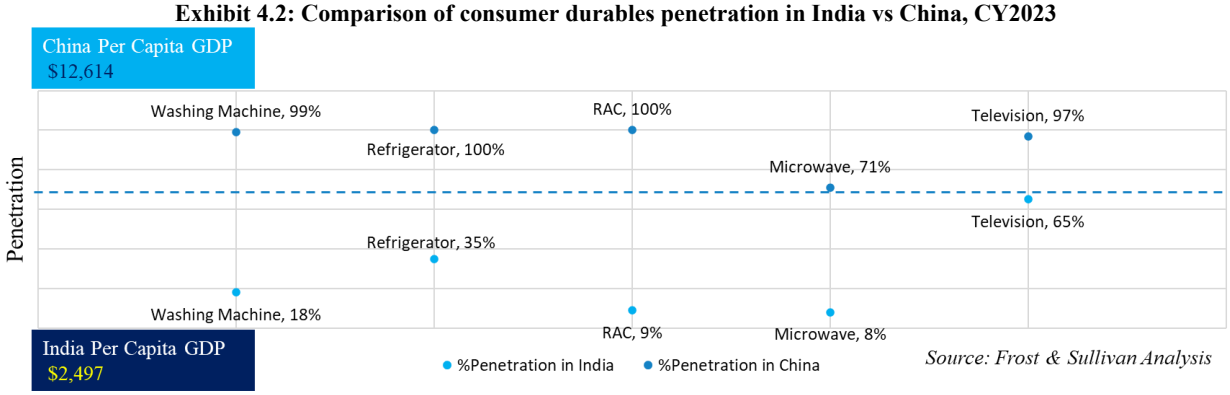
Market Trends

- **China+1 Strategy:** With geopolitical and trade uncertainties surrounding China, multinational corporations are diversifying their supply chains. The "China+1" strategy is resulting in the relocation of manufacturing operations to India. This shift is benefiting the consumer durables industry, as companies look to tap into India's large and growing market while reducing reliance on China.
- **Surging Demand from Rural and Semi-Urban Markets:** The increasing presence of brands and a greater focus on rural and semi-urban markets is leading to a surge in demand for consumer durables. Enhanced distribution networks, rural electrification, and improved infrastructure are driving this growth. Brands are increasingly targeting these regions, which were once less accessible.
- **Digitalization and E-Commerce Growth:** The rise of e-commerce in India is transforming how consumers shop for appliances. With greater internet penetration, online sales of consumer durables are growing rapidly. This has made it easier for consumers to access a variety of brands, compare prices, and make informed purchasing decisions, fueling market growth.

4.1.4. Comparison of white goods penetration between India and China at current GDP levels

There is a clear correlation between per capita GDP and the penetration of consumer durables, as higher income levels generally enable greater access to such goods. For example, countries like China, with a higher per capita GDP, tend to have widespread ownership of consumer durables like air conditioning units, washing machines, and microwaves.

Exhibit 4.2: Comparison of consumer durables penetration in India vs China, CY2023



Source: Frost & Sullivan Analysis

In CY2007, China's per capita GDP was USD 2,497, and at this level, the penetration of key appliances was significantly high, with RACs at 54%, refrigerators at 71%, and washing machines at 61%. In comparison, India's penetration levels for these appliances at a similar GDP per capita are notably lower. However, with its growing economy and expanding middle class, India is experiencing increasing penetration rates for these products. While still behind more developed markets, this gap underscores the different stages of market development and highlights India's strong potential for growth as household incomes continue to rise.

4.1.5. Government schemes

Benefits for Consumers

- **Increased affordability:** Government subsidies and financial inclusion schemes have significantly enhanced the affordability of home appliances for a broader spectrum of consumers, particularly those in low-income households. Initiatives like the Pradhan Mantri Jan Dhan Yojana, launched in 2014, have facilitated the opening of over 475 million bank accounts, granting millions access to credit and financial services. This financial empowerment enables consumers to secure loans and subsidies for appliance purchases. Additionally, the government has introduced subsidies for energy-efficient appliances, including LED bulbs and efficient fans, thereby making them more accessible to budget-conscious consumers. Furthermore, the replacement of non-star rated air conditioners with Bureau of Energy Efficiency (BEE) 5-star labeled and inverter ACs has also contributed to making energy-efficient options more attainable, promoting both affordability and sustainability in household appliances.
- **Improved energy efficiency:** Energy efficiency standards and subsidies have encouraged manufacturers to produce energy-efficient appliances, which can help consumers save on electricity costs. The government has implemented energy efficiency standards for various home appliances, such as refrigerators, washing machines, and air conditioners. These standards have led to a significant increase in the availability of energy-efficient appliances in the Indian market. For example, the Bureau of Energy Efficiency (BEE) has implemented a star rating system for refrigerators and air conditioners, which has encouraged manufacturers to produce more energy-efficient models.

- **Access to quality products:** Government initiatives have helped to improve the quality of home appliances available in the Indian market. The government has implemented quality control measures and standards to ensure that appliances meet certain safety and performance requirements. This has benefited consumers by providing them with reliable and durable products that are less likely to break down or malfunction.

Role of Direct Benefit Transfer (DBT) in increasing Rural demand

The Direct Benefit Transfer (DBT) scheme has played a significant role in increasing rural demand for various goods and services, including home appliances. DBT involves transferring subsidies and benefits directly to the beneficiaries' bank accounts, eliminating the need for intermediaries and reducing leakages. This has several benefits for rural consumers:

- **Increased financial inclusion:** DBT has helped to bring millions of rural households into the formal banking system, providing them with access to credit and other financial services. This has enabled them to make larger purchases, including home appliances.
- **Reduced corruption:** By eliminating intermediaries, DBT has helped to reduce corruption and leakages in the delivery of subsidies and benefits. This has ensured that more funds reach the intended beneficiaries, leading to increased demand for goods and services.
- **Improved targeting:** DBT has allowed for more precise targeting of subsidies and benefits, ensuring that they reach the most vulnerable and needy households. This has helped to increase demand for essential goods and services, including home appliances.

In addition to DBT, several other factors have contributed to the increase in rural demand for home appliances:

- **Rural electrification:** The government's efforts to improve rural electrification have made it possible for more rural households to use appliances that require electricity, such as refrigerators, washing machines, and fans.
- **Government schemes:** Various government schemes, such as the Pradhan Mantri Awas Yojana (PMAY) and the National Rural Livelihoods Mission (NRLM), have provided financial assistance to rural households, enabling them to purchase home appliances.
- **Changing lifestyles:** Rural lifestyles are becoming more urbanized, with people seeking greater convenience and comfort. This has led to increased demand for home appliances, such as refrigerators, televisions, and smartphones.

Benefits for Manufacturers

- **Government initiatives:** Several government initiatives aimed at enhancing manufacturing capabilities in India, such as the Make in India Initiative, the Industrial Corridor Development Programme, and the PM Gati Shakti National Master Plan (NMP), are providing significant support to manufacturers. The National Logistics Policy is also noteworthy, as it aims to improve logistics efficiency and reduce costs, ultimately benefiting manufacturers by streamlining supply chains and enhancing market accessibility.
- **Increased demand:** Government schemes have led to increased demand for home appliances, which has benefited manufacturers by providing them with a larger market for their products. For example, the Pradhan Mantri Awas Yojana, launched in 2015, has provided affordable housing subsidies to millions of people. This has led to increased demand for appliances as people move into new homes

and furnish their properties. Additionally, government initiatives to improve rural electrification have expanded the potential market for home appliances to rural areas.

- **Incentives for innovation:** Government subsidies and incentives have encouraged manufacturers to invest in research and development to develop new and innovative products. For example, the government has provided subsidies for manufacturers to develop energy-efficient appliances and smart home technologies. These incentives have helped to drive innovation in the home appliances industry, leading to the introduction of new and advanced products.
- **Export opportunities:** Government initiatives have helped to create favorable conditions for the export of Indian-made home appliances. The government has implemented policies to reduce tariffs and trade barriers, making it easier for Indian manufacturers to export their products to international markets. This has provided manufacturers with opportunities to expand their businesses and reach new customers.

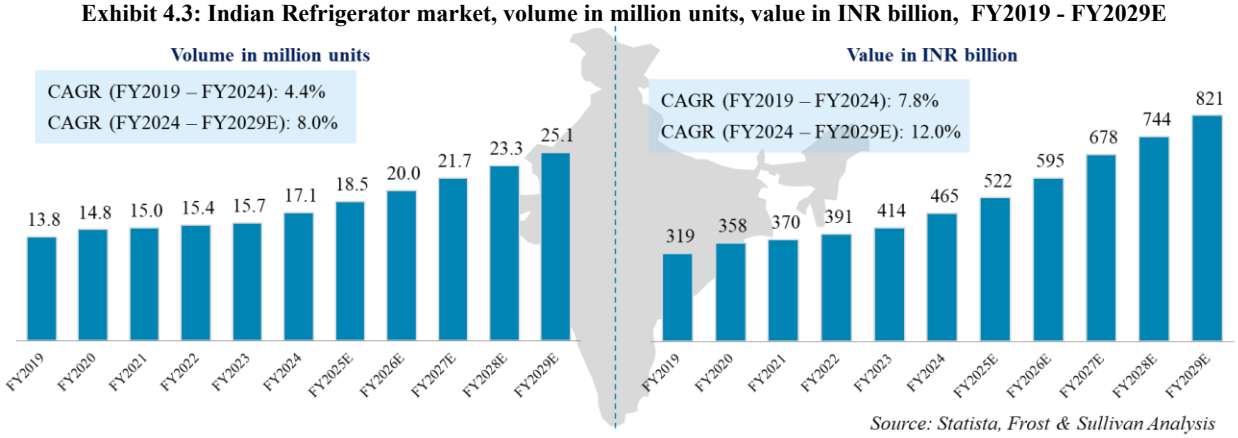
4.2 Refrigerator

4.2.1. Size of the Refrigerator market

The Indian refrigerator market is set for significant growth in FY2024, driven by changing consumer dynamics and emerging trends. The rise of nuclear families and improved credit access are shaping lifestyle preferences that prioritize convenience. Technological advancements have diversified refrigerator models to meet varying needs, while a reliable electricity supply enhances their usability. As consumers become more conscious of energy efficiency, the demand for innovative, high-quality refrigerators is increasing, reflecting a broader shift towards sustainable living and modern conveniences in Indian households.

In terms of revenue, the refrigerator market was valued at INR 465 billion in FY2024, with expectations to grow to INR 821 billion by FY2029E, reflecting a CAGR of 12.0%. This growth trajectory highlights the industry's potential to adapt to evolving consumer preferences and capitalize on emerging market opportunities in FY2025 and beyond.

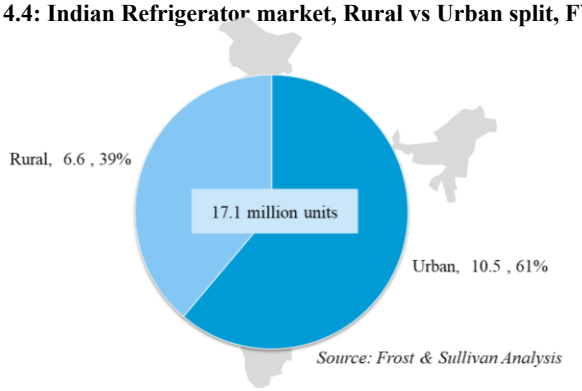
Exhibit 4.3: Indian Refrigerator market, volume in million units, value in INR billion, FY2019 - FY2029E



Source: Statista, Frost & Sullivan Analysis

India's refrigerator market, with sales of 17.1 million units, shows a clear divide between urban and rural regions. Urban areas, with higher penetration rates, account for around 10.5 million units sold. In contrast, rural areas contribute approximately 6.6 million units.

Exhibit 4.4: Indian Refrigerator market, Rural vs Urban split, FY2024



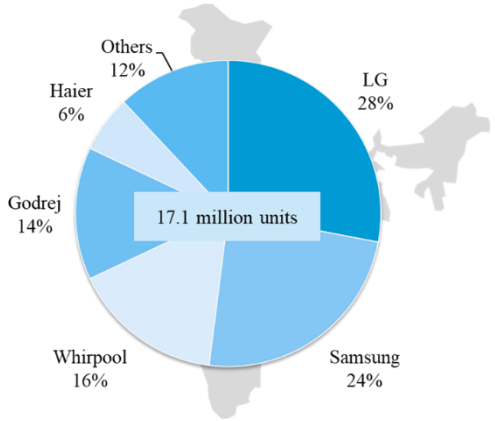
Source: Frost & Sullivan Analysis

4.2.2. Market split by key players

The Indian refrigerator market is notably concentrated, with LG and Samsung leading the charge, together commanding 52.0% of total domestic sales in FY2024. These brands distinguish themselves through a diverse range of technologically advanced refrigerators, featuring various capacities, colors, designs, and energy ratings to cater to the evolving preferences of Indian consumers.

In addition to innovations like water dispensers and automatic ice makers, brands are increasingly incorporating smart features such as Wi-Fi connectivity, enabling consumers to monitor and control their appliances remotely. The push for energy efficiency aligns with India's sustainability goals, as brands promote models with higher star ratings and eco-friendly refrigerants.

Exhibit 4.5: Indian Refrigerator market, split by key players, FY2024



Source: Stakeholders Interaction; Frost & Sullivan Analysis

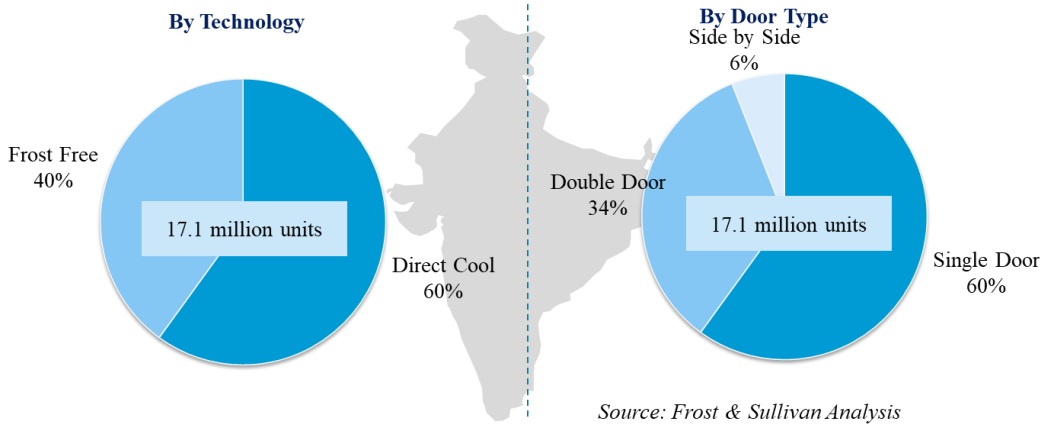
Furthermore, marketing strategies are becoming more localized, tailoring product launches to specific regional needs and preferences, ensuring deeper market penetration. This competitive landscape underscores the importance of continuous innovation and consumer engagement in driving growth in the Indian refrigerator sector.

4.2.3. Market segmentation by product category

In the Indian refrigerator market, direct cool and frost-free systems dominate, with direct cool models holding approximately 60% market share in FY2024 due to their affordability and low maintenance needs. In contrast, frost-free refrigerators, which utilize electric fans for even cooling, account for about 40% of the market and are projected to grow significantly, driven by rising demand for energy efficiency and better performance.

Single-door refrigerators continue to lead sales at 60.0%, appealing to budget-conscious consumers. However, double-door models are gaining popularity, comprising overall 40.0% of the market as consumers seek larger capacities and aesthetic enhancements. Out of this 6.0% include double-door side-by-side refrigerators, which offer flexible organization but are less common. In FY2024, the cost of specific components as a percentage of the total refrigerator cost shows the relative stability of material expenses for each item. Soft seals represent about 1.0 – 2.5% of the total refrigerator cost, while rigid profiles account for 1.0 – 2.5%. Glass costs are divided, with 2.0 – 4.0% allocated to the refrigerator shelf and a notably higher 12.0 – 15.0% for the refrigerator door. Additionally, HIPS ABS sheets contribute approximately 4.0 – 6.0% to the total refrigerator cost. These percentages reflect the distribution of material costs, with glass components, especially for the door, representing a significant portion compared to other materials.[1] As of FY2024, manufacturers are focusing on innovative design features, with printed toughened glass doors becoming a popular trend in refrigerators. This design offers a sleek, modern look while providing enhanced durability, catering to consumers' increasing preference for stylish and functional home appliances. The growing demand for such premium features reflects a shift toward aesthetically appealing products that complement contemporary home interiors.

Exhibit 4.6: Indian Refrigerator market, split by category, FY2024

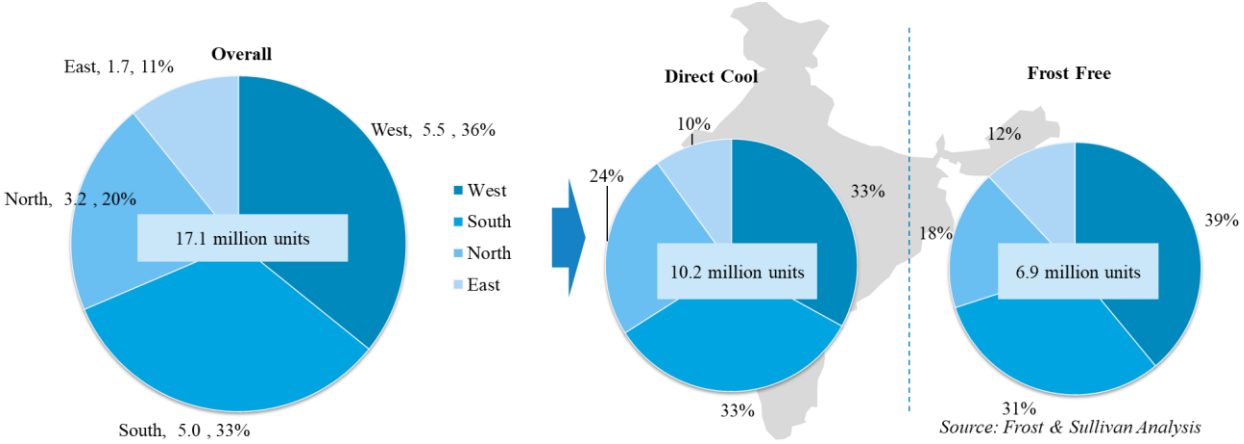


Source: Frost & Sullivan Analysis

4.2.4. Market segmentation by region

The western and southern regions of India serve as key demand centres for refrigerators.

Exhibit 4.7: Indian Refrigerators market, domestic sales split by region, FY2024



Source: Frost & Sullivan Analysis

[1] *Please note that the material cost for the refrigerator is assumed at 45% of the total average price of the product*

The southern region, in particular, is a vital market influenced by high urbanization rates and warm weather conditions prevailing for much of the year. These elements are anticipated to significantly contribute to market growth throughout the forecast period.

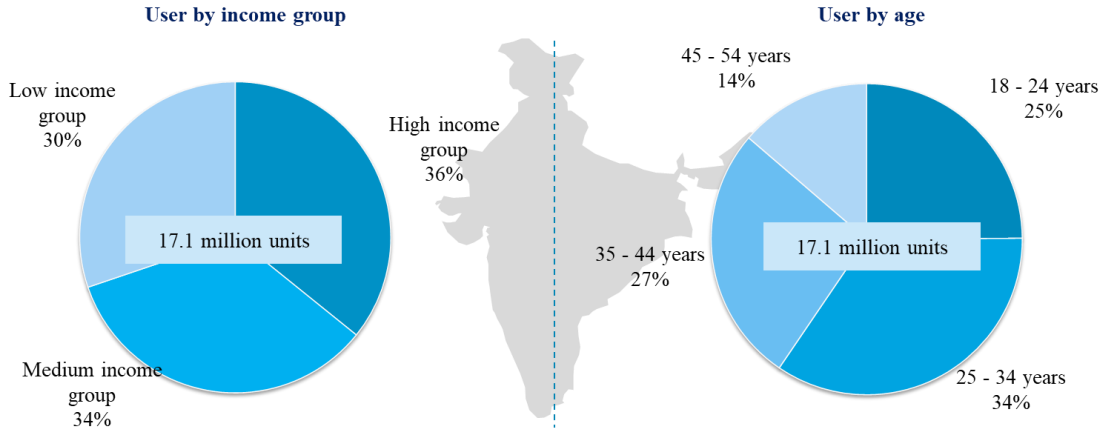
4.2.5. Market segmentation by demography

The Indian refrigerator market reflects a diverse consumer base influenced by income and age demographics. The high-income segment accounts for 36% of sales, driven by demand for premium models with smart technology and energy-efficient designs. The medium-income group makes up 34.0%, balancing value with functionality, while the low-income segment, at 30.0%, prioritizes affordability and basic features.

Age-wise, the 25-34 age group leads with 35.0% of sales, reflecting young households' investment in modern appliances. The 18-24 bracket contributes 25.0%, indicating a growing trend among young adults towards kitchen appliances.

Meanwhile, the 35-44 age group, at 27.0%, focuses on reliability and storage for expanding families. The 45-54 age group, at 14.0%, shows a lower propensity for new purchases as many consumers have established units. As of FY2024, the rise of eco-conscious consumers is prompting brands to innovate in sustainability, incorporating recyclable materials and energy-efficient technologies, aligning with the increasing consumer preference for responsible and modern household solutions.

Chart 4.8: Indian Refrigerator market, split by demography, FY2024[2]



Source: Statista, Frost & Sullivan Analysis

4.2.6. In-house manufacturing vs Outsourcing

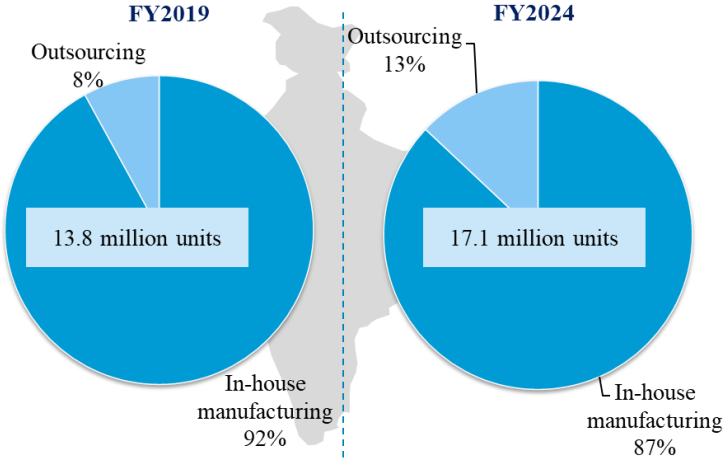
Currently, major original equipment manufacturers (OEMs) in India predominantly manage refrigerator production in-house, although some premium models, such as side-by-side and frost-free refrigerators, continue to be imported. However, few players like LG have developed capacities within the country to manufacture side-by-side refrigerator units. In FY2024, in-house manufacturing accounts for 87% of refrigerator production by volume, with only 13% attributed to outsourcing, and is anticipated to reach 17-20% by FY2029E.

Manufacturers like GEM Appliances and MIRC Electronics play a minimal role in the outsourcing segment. Notably, large OEMs such as Panasonic and Haier not only focus on in-house production but also engage

[2] *Note: Low income: Households earning less than INR 200,000 annually, Middle income: Households earning > INR 200,000 and upto INR 1 million annually, High income: Households earning more than INR 1 million annually*

in contract manufacturing for other prominent brands, reflecting a collaborative approach within the industry. As the refrigerator market evolves, the trend of contract manufacturing, particularly white labelling, is gaining traction. In this model, Electronics Manufacturing Services (EMS) providers take full responsibility for the design, production, and assembly of refrigerators. This allows brands to offer high-quality appliances without making substantial investments in manufacturing infrastructure, making it especially appealing for those looking to diversify their product lines rapidly and cost-effectively.

Exhibit 4.9: Indian Refrigerator market split by in-house manufacturing vs. outsourcing, FY2019 and- FY2024



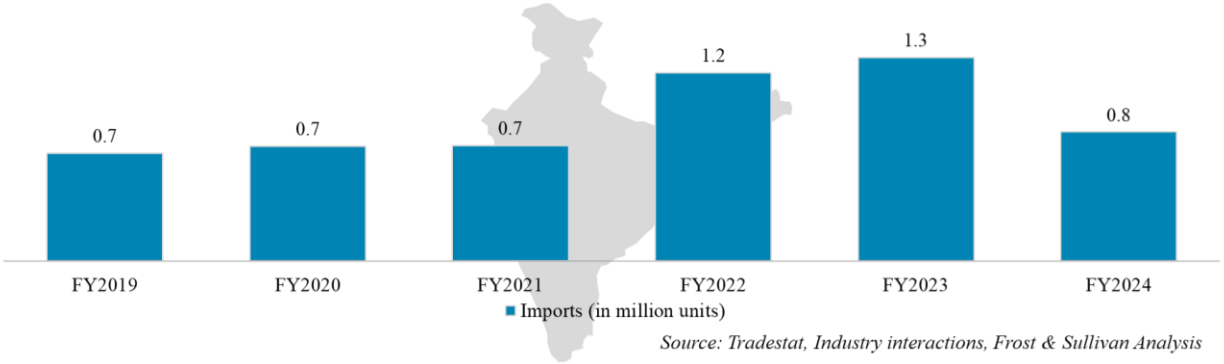
Source: Frost & Sullivan Analysis

Looking ahead, the demand for white-labelled refrigerators is expected to grow significantly, driven by the need for flexibility in product offerings and the increasing popularity of premium features, such as printed toughened glass doors that enhance both functionality and aesthetics. This section will further explore the current status and future scope of contract manufacturing in India, focusing on the role of EMS providers in handling design, production, and assembly.

4.2.7. Import

From FY2019 to FY2021, refrigerator imports in India remained steady at 0.7 million units annually, reflecting the strength of local production capabilities. However, FY2022 saw a sharp rise to 1.2 million units, driven by increasing consumer demand for premium models with advanced features, as disposable incomes rose. This upward trend continued into FY2023, with imports reaching 1.3 million units, indicating consumers' growing appetite for diverse, high-end refrigerators.

Exhibit 4.10: Indian Refrigerator import volume in million units, FY2019 - FY2024



Source: Tradestat, Industry interactions, Frost & Sullivan Analysis

In FY2024, imports fell to 0.8 million units, likely due to a shift towards local manufacturing, supported by government initiatives like 'Make in India,' which has boosted affordability and made locally produced models more relevant for Indian consumers. While rising disposable incomes are driving demand for

premium products, urbanization is playing a different role by increasing sales of entry- to mid-level refrigerators, as more households in urban areas seek accessible and functional appliances. This divergence in trends underscores the nuanced impact of urbanization and income growth on various market segments.

4.2.8. Growth Drivers, Market Trends & Government schemes

Growth Drivers

- **Rise of Nuclear Families:** The increasing trend of nuclear families in urban areas is propelling the demand for compact and efficient refrigerators, catering to smaller households with limited space.
- **Increased Urbanization:** Rapid urbanization has led to higher disposable incomes and lifestyle changes, driving the need for modern appliances like refrigerators that enhance convenience and food preservation.
- **Premiumization** is a significant growth driver in the Indian refrigerator market, as consumers increasingly favor high-end features like multi-door, frost-free models, glass doors, water dispensers, and side-by-side configurations.
- **Technological Advancements:** Innovations in cooling technology, such as inverter compressors, smart connectivity features, and energy-efficient designs, are attracting tech-savvy consumers who prioritize efficiency and sustainability.
- **Evolving Consumer Preferences:** There is a growing awareness and preference for energy-efficient and environmentally friendly appliances, leading to higher demand for frost-free and multi-door refrigerators that offer better energy savings.
- **Improved Retail Infrastructure:** The expansion of modern retail channels, including e-commerce platforms and exclusive brand outlets, has made refrigerators more accessible to consumers, facilitating increased sales and brand visibility.
- **Rising Middle-Class Population:** The expanding middle class with increasing purchasing power is driving the demand for a wider range of refrigerator options, from basic models to high-end variants, catering to diverse consumer needs.
- **Health Consciousness:** Growing health awareness among consumers is fueling the demand for refrigerators equipped with advanced storage solutions to preserve food quality and nutritional value, such as fresh fruit and vegetable compartments.
- **Other contributing factors** include easy financing options, such as Equated Monthly Installment (EMI) schemes, which enhance accessibility to premium products. Additionally, festive season sales provide opportunities for manufacturers and retailers to capitalize on consumer interest in upgraded appliances. Together, these trends highlight the evolving demands of Indian consumers and the growing importance of premium features in their purchasing decision.

Market Trends

- **Customization and Aesthetics:** Manufacturers are focusing on offering customizable designs and aesthetic finishes to meet consumer preferences for modern and stylish kitchen appliances.
- **Smart Refrigerators:** The emergence of smart refrigerators, equipped with IoT technology, allows users to monitor and control their appliances remotely, leading to a growing market for high-tech models with connectivity features.

- **Emphasis on Sustainability:** Brands are increasingly investing in sustainable manufacturing processes and eco-friendly materials, aligning with the growing consumer demand for environmentally responsible products.
- **Growth of Compact Refrigerators:** With urban living spaces becoming smaller, compact and mini refrigerators are gaining popularity, especially among college students and working professionals living alone.
- **Focus on Energy Efficiency:** As energy costs rise, consumers are increasingly opting for energy-efficient models that reduce power consumption, prompting manufacturers to enhance their energy ratings and provide informative labels.
- **Regional Variations in Demand:** Different regions in India exhibit varied preferences based on climatic conditions, cultural factors, and economic demographics, leading to tailored marketing strategies by manufacturers.

Government Schemes

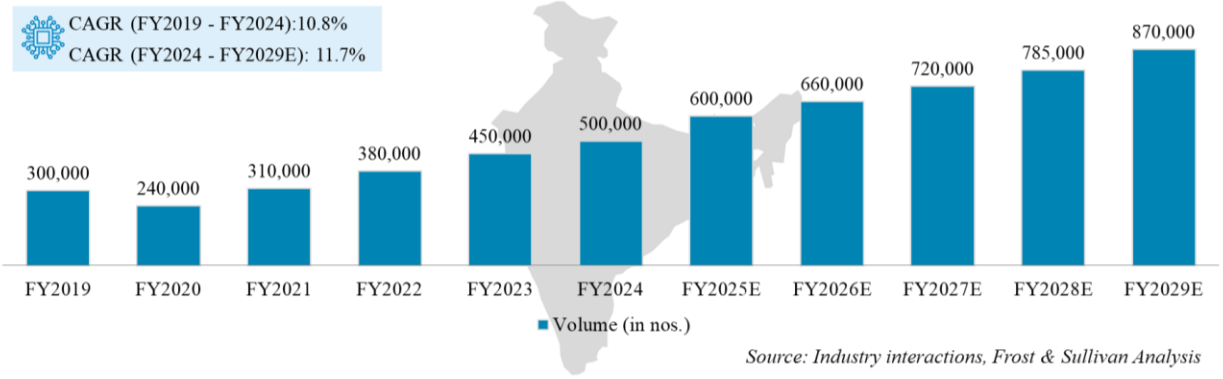
- **Make in India Initiative:** This initiative aims to boost domestic manufacturing, providing incentives for local production of refrigerators and components, ultimately reducing dependence on imports and encouraging job creation.
- **Faster Adoption and Manufacturing of Electric Vehicles (FAME) Scheme:** Though primarily aimed at electric vehicles, this scheme also supports the development of energy-efficient appliances, including refrigerators, that contribute to the overall reduction of carbon emissions.
- **Bureau of Energy Efficiency (BEE) Standards:** The government mandates energy efficiency standards for refrigerators, encouraging manufacturers to innovate and produce models with higher energy ratings, which benefits both consumers and the environment.
- **Atmanirbhar Bharat Abhiyan:** This self-reliant initiative promotes local manufacturing and entrepreneurship, supporting small and medium-sized enterprises in the refrigerator sector through financial aid and skill development programs.
- **Subsidies for Renewable Energy**: The government offers incentives for the adoption of renewable energy solutions, encouraging consumers to invest in energy-efficient appliances, including refrigerators that can operate with solar power.

4.3 Visi Cooler

4.3.1. Size of Visi cooler market

The Visi cooler market in India has shown steady growth, with increasing demand across commercial sectors. In FY2022, sales volumes were recorded at 380,000 units, which grew to 450,000 units in FY2023, reflecting rising demand for cold storage solutions in retail outlets, restaurants, and other businesses. By FY2024, this figure further increased to 500,000 units, underscoring the expanding commercial use of visi coolers for beverage and perishable storage. Looking ahead, the market is projected to maintain this upward trend, with sales expected to reach 600,000 units in FY2025E and 660,000 units in FY2026E. Growth is forecasted to continue through FY2027E, with anticipated sales of 720,000 units, while the demand is expected to further rise in FY2028E and FY2029E, with estimates of 785,000 units and 870,000 units, respectively.

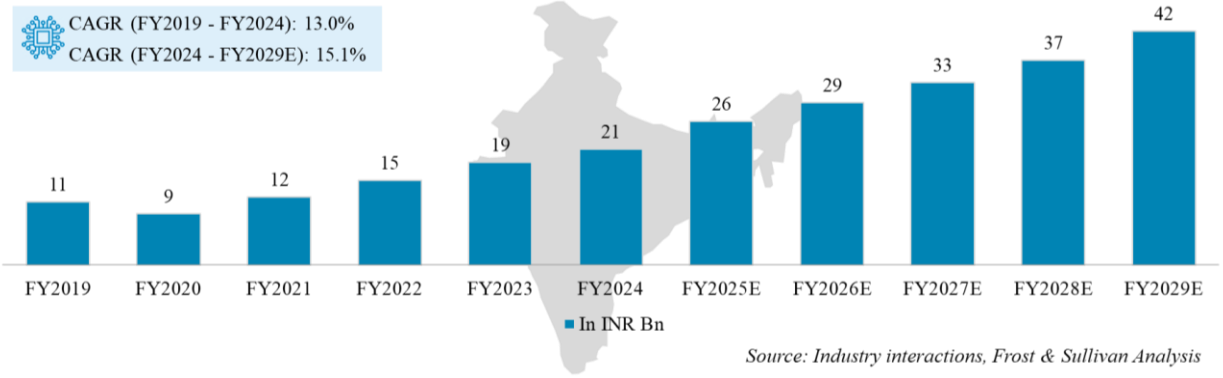
Exhibit 4.11: Indian Visi cooler market, in number of units, FY2019 – FY2029E



Source: Industry interactions, Frost & Sullivan Analysis

The growth trajectory is driven by factors such as the expansion of organized retail, the rapid proliferation of food and beverage outlets, and a broader shift towards efficient, modern cooling solutions. Additionally, as businesses focus on energy efficiency and sustainability, advancements in visi cooler technology are expected to continue driving market demand. With increasing emphasis on maintaining product quality and freshness in the food and beverage sector, the market for visi coolers is expected to experience robust and consistent growth over the coming years.

Exhibit 4.12: Indian Visi cooler market, in INR Bn, FY2019 – FY2029E



Source: Industry interactions, Frost & Sullivan Analysis

4.3.2. Segmentation by capacity

In FY 2024, the Indian visi cooler market displayed diverse consumer preferences across different capacity, door, and placement segments, reflecting the evolving needs of the commercial cooling space.

Segmentation by Capacity: The 250–600 L segment led the market, capturing 52.0% share, as it offers versatility ideal for a wide range of business applications. Smaller units, up to 250 L, accounted for 33.0% of the market, catering primarily to smaller retailers needing compact cooling solutions. Meanwhile, the 600–1,100 L segment represented 9% of the market, indicating a growing interest in larger units that enhance product visibility and customer engagement. The demand for higher-capacity visi coolers, though still limited, highlights a shift towards optimizing merchandising through increased storage and display options.

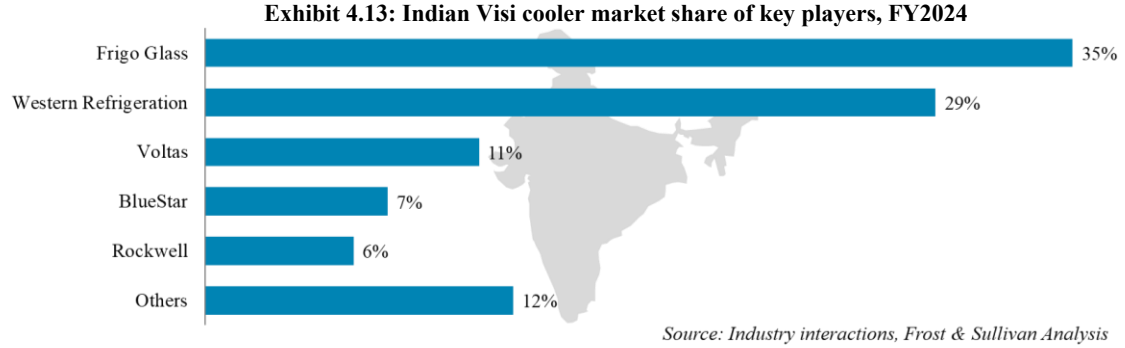
Segmentation by Number of Doors: Single-door visi coolers remained the most popular choice in FY2024, accounting for 76% of the market, up slightly from 75.0% in FY2019. Their practicality and suitability for smaller retail spaces make them the preferred option for many businesses. Double-door units held steady at around 20% of the market, appealing to stores with moderate display needs, while triple-door coolers occupied a niche share, dropping from 5% in FY2019 to 4.0% in FY2024.

Segmentation by Placement: Floor-standing visi coolers dominated the market, making up about 76.0% of total sales in FY 2024. Their larger storage capacities and enhanced visibility make them well-suited for high-traffic retail environments, where they effectively support product display and accessibility. Tabletop models, on the other hand, maintained a smaller presence of ~24%, primarily serving niche segments with limited space, underscoring the role of floor-standing units as the preferred choice for efficient merchandising. Soft seals make up around 0.5 – 1.5% of the total Visi cooler cost, while rigid profiles account for 0.9 – 2.0%. Glass represents a more significant share at 7.0 – 10.0%, reflecting its critical role in the cooler's functionality and aesthetic. These component costs illustrate the varying impact of each material on overall expenses, with glass as the highest single cost driver among these items.[3]

4.3.3. Market share of key players

The commercial beverage cooler market in India features several key players, with Frigo Glass Pvt. Ltd. leading the segment, holding a market share of 35%. Following closely is Western Refrigeration with a share of 29%. Other significant competitors include Voltas at 11%, Bluestar at 7% and Rockwell Industries at 6%. Collectively, other companies account for approximately 12% of the overall market share, showcasing a diverse competitive landscape. Notable players within this space include Norcool, Celfrost, Elanpro, and AASTU Refrigeration. As the market continues to evolve, these shares may fluctuate in response to changing consumer preferences and competitive dynamics.

Exhibit 4.13: Indian Visi cooler market share of key players, FY2024



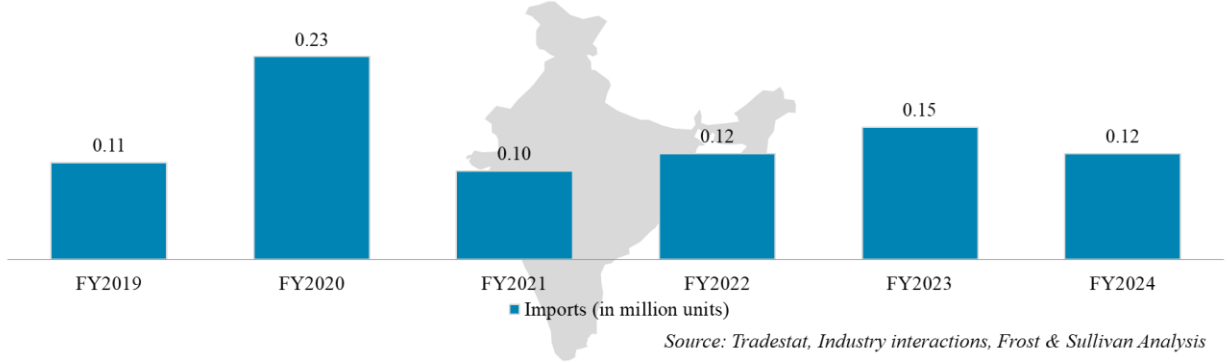
Source: Industry interactions, Frost & Sullivan Analysis

Others include Norcool, Elanpro ECG, Cellfrost, AASTU Refrigeration

4.3.4. Import

The import data for visi coolers in India from FY2020 to FY2024 reveals significant fluctuations, reflecting changing market dynamics. After reaching a peak of 0.23 million units in FY2020, with a sharp dip in

Exhibit 4.14: Indian Visi cooler import volume in millions, FY2019 - FY2024



Source: Tradestat, Industry interactions, Frost & Sullivan Analysis

[3] *Please note that the material cost for the Visi cooler is assumed to be 50% of the total average product price.*

FY2021 folllowed by partial recovery.This trend may reflect disruptions (such as pandemic-related challenges) and a shift towards bolstering domestic production capabilities to reduce dependency on imports. There is also a growing focus on self-reliance in the appliance sector amid evolving consumer preferences.

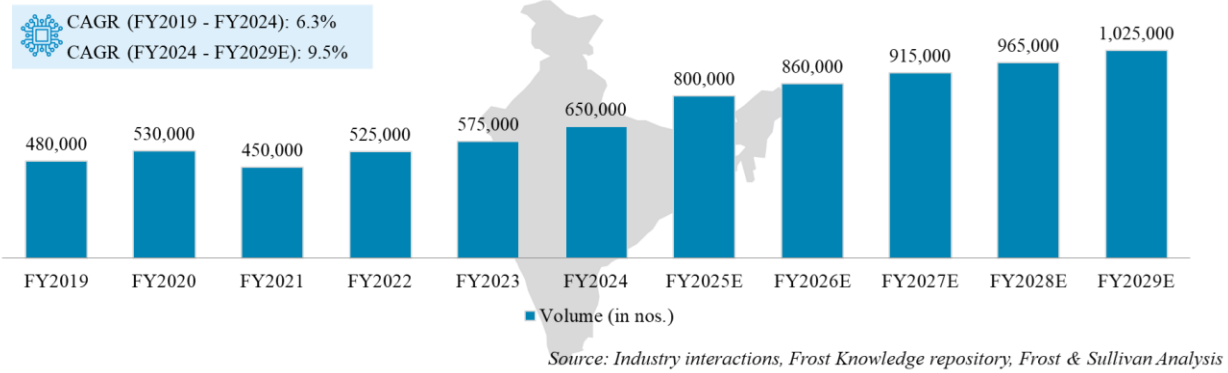
4.4 Deep freezer

The deep freezer market in India is poised for robust growth, propelled by increasing demand from the food retail and hospitality sectors. Urbanization and evolving consumer lifestyles are enhancing the need for efficient food preservation. Leading manufacturers are responding by launching energy-efficient models equipped with advanced features. The market is primarily segmented into upright and chest freezers, with chest freezers dominating due to their larger capacities and cost-effectiveness. As storage requirements continue to rise, the deep freezer market is expected to flourish in the coming years.

4.4.1. Size of Deep Freezer Market

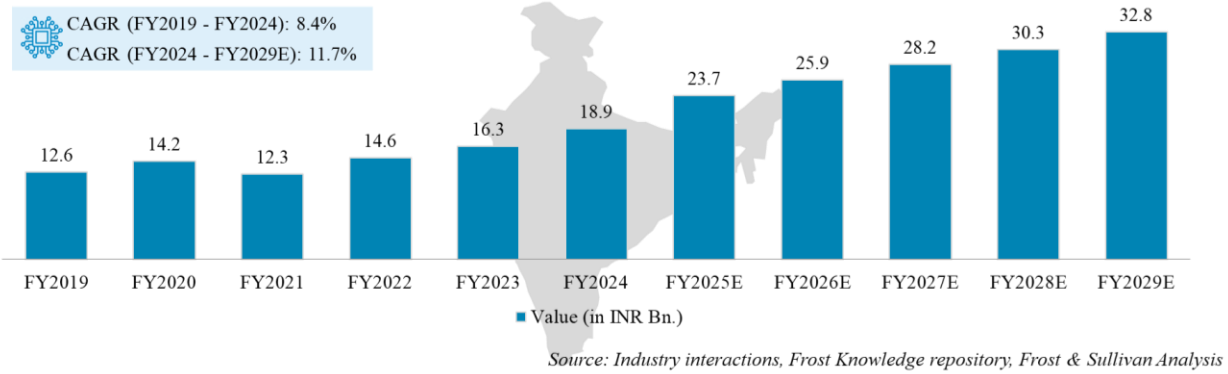
The deep freezer market is expected to rise from approximately 480,000 units in FY2019 to an estimated 1,025,000 units by FY2029E. The sales volume in India is experiencing steady growth and is projected to expand at a compound annual growth rate (CAGR) of 9.5% from FY2024 to FY2029.

Exhibit 4.15.a: Indian Deep freezer market in number of units, FY2019 – FY2029E



Source: Industry interactions, Frost Knowledge repository, Frost & Sullivan Analysis

Exhibit 4.15.b: Indian Deep freezer market in INR billion, FY2019 – FY2029E



Source: Industry interactions, Frost Knowledge repository, Frost & Sullivan Analysis

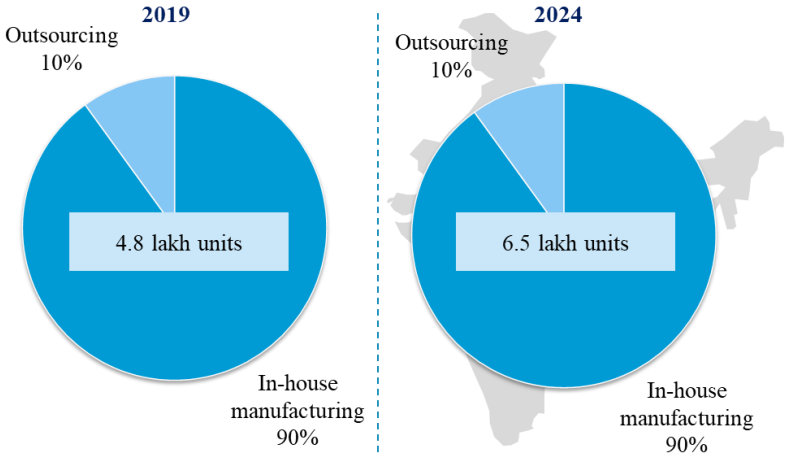
This growth is indicative of increasing demand for efficient freezing solutions across various sectors, including retail, food services, and households. The trend reflects a broader focus on food preservation and storage, driven by evolving consumer preferences and the expansion of the food and beverage industry.

4.4.2. In-house manufacturing vs Outsourcing

The deep freezer market in India demonstrates a strong in-house manufacturing base, with 90% of the total 650,000 units produced in-house. This significant production capacity indicates a growing self-reliance in

the sector. In contrast, outsourcing represents 10% of the market, indicating a relatively low reliance on outsourcing.

Exhibit 4.16: Indian Deep freezer market, split by in-house manufacturing vs Outsourcing, FY2019 and FY2024



Source: Frost & Sullivan Analysis

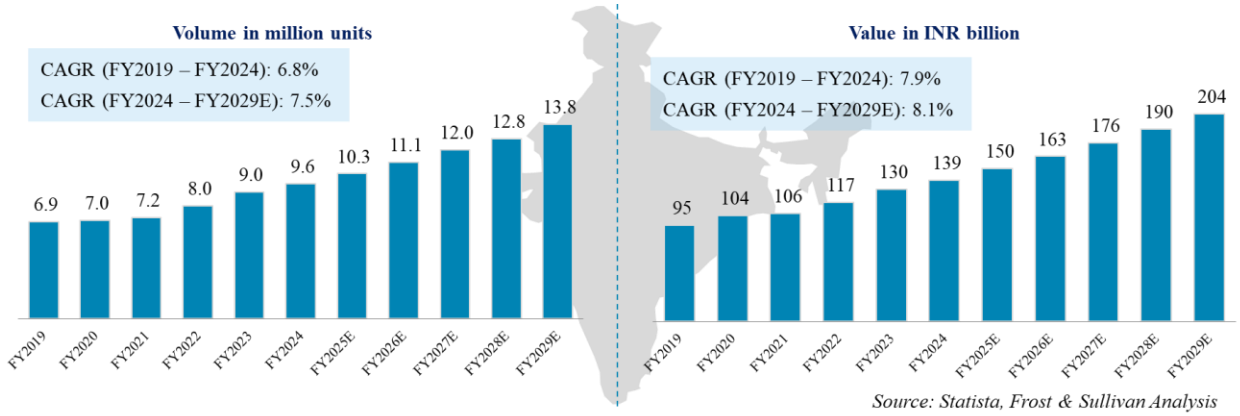
The emphasis on in-house manufacturing aligns with the increasing demand for efficient food preservation solutions in various sectors, highlighting the market's potential for further growth and innovation in response to evolving consumer preferences. In FY2024, the material cost structure for the deep freezer shows a consistent distribution of component expenses as a percentage of the total cost. Soft seals constitute approximately 0.5 – 2.0% of the total cost, while rigid profiles account for 2.0 – 4.0%. Glass makes up a more substantial portion at 4.0 – 7.0%, reflecting its importance in the freezer's design and functionality. These percentages highlight the varied impact of each component, with glass being the largest cost contributor among these items. [4]

4.5 Washing Machine

4.5.1. Size of the Washing machine market

The Indian washing machine industry is witnessing strong momentum, driven by dual-income households, rising incomes, and a focus on convenience. Additionally, it may imply that manufacturers are successfully

Exhibit 4.17: Indian Washing machines market, volumes in million, value in INR billion, FY2019 – FY2029E

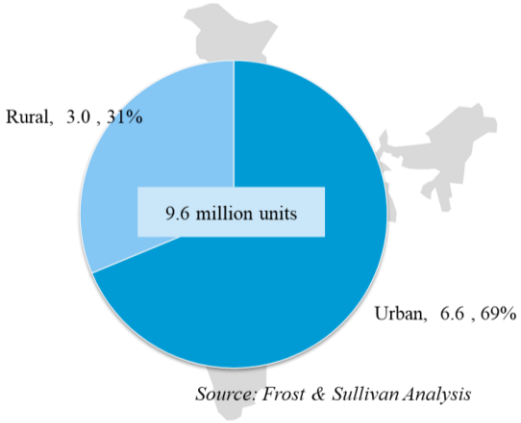


Source: Statista, Frost & Sullivan Analysis

[4] *Please note that the material cost for the deep freezer is assumed to be 50% of the total average product price*

introducing higher-value products or premium features that resonate with consumer needs, further driving value growth in the market. The Compound Annual Growth Rate (CAGR) for washing machine sales in India is expected to increase from 7.9% (FY2019-FY2024) to 8.1% (FY2024-FY2029E) in value terms and this can be attributed largely to the growth achieved in rural areas. Aditionally, while rural and smaller markets continue to adopt washing machines, the pace of expansion is gradual.

Exhibit 4.18: Indian Washing machines market, Rural vs Urban split, FY2024



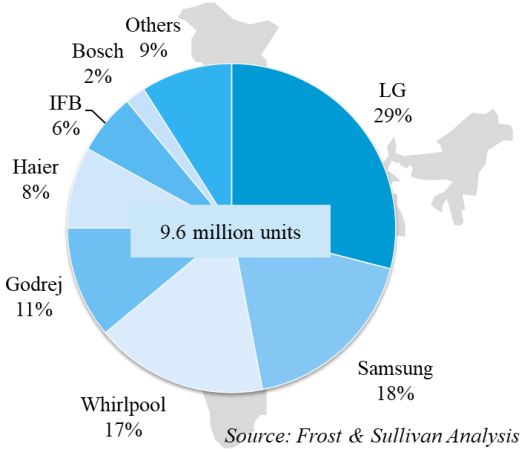
Source: Frost & Sullivan Analysis

To sustain future growth, companies are increasingly focusing on innovation, and product differentiation, and are developing strategies to penetrate rural markets effectively, adapting to the evolving landscape of consumer needs and market dynamics. With urban and rural sales split at 69% and 31% respectively, there's substantial room for market growth. Consumers are now opting for smart, energy-efficient washing machines that align with modern lifestyles and sustainability goals.

4.5.2. Market split by key players

The Indian washing machine market is intensely competitive, with LG, Samsung, Godrej, and Whirlpool commanding a substantial 75% market share.

Exhibit 4.19: Indian Washing machine market, split by key players, share in %, FY2024



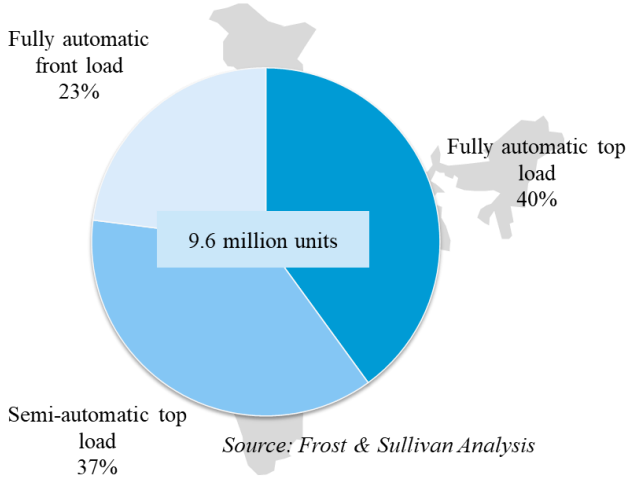
Source: Frost & Sullivan Analysis

Notable brands like IFB, Bosch, Haier and others make up the remaining 25%. In response to energy labels and efficiency mandates, manufacturers are prioritizing the development of energy-efficient models. Additionally, domestic brands are shifting focus to rural markets, where growth potential remains untapped while enhancing technology and expanding manufacturing capabilities to compete effectively against international players in urban centres.

4.5.3. Market segmentation by product category

In 2024, fully automatic washing machines dominate the Indian market, representing 63.0% of total sales, with significant growth anticipated. Their appeal lies in advanced features like tumble motion and integrated water heaters, which enhance stain removal while conserving water and energy.

Exhibit 4.20: Indian Washing machines market split by product category, FY2024



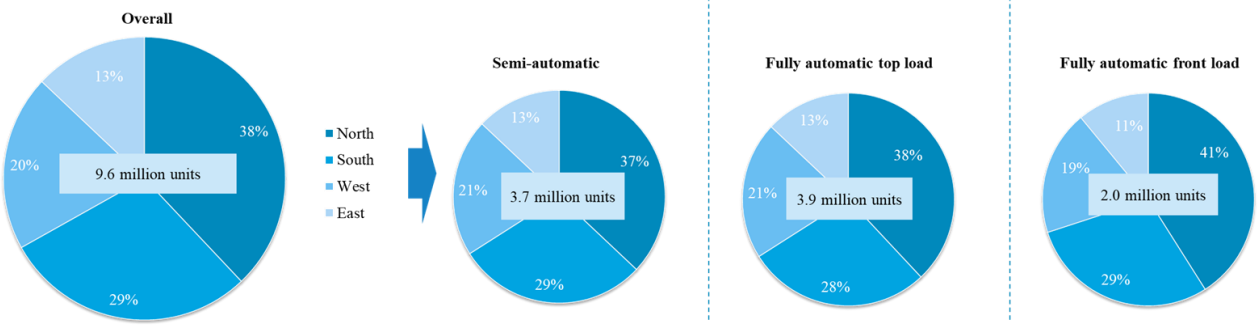
Source: Frost & Sullivan Analysis

The preference for top-loading machines remains strong due to price differentials, although front-loaders are gaining traction among eco-conscious consumers. As urbanization increases and lifestyles become busier, the demand for efficient and convenient appliances is set to rise, positioning fully automatic models favorably in the evolving market landscape.

4.5.4. Market segmentation by region

In FY2024, the North and South regions accounted for 67% of total sales in the Indian washing machine market. Fully automatic machines dominate this market, particularly in North India, with a growing preference for these machines observed across all regions. APL's strategically located manufacturing hubs in Greater Noida, Mohali, and Pune are well-positioned to meet the increasing demand for fully automatic machines in these key regional markets.

Chart 4.21: Indian Washing machines market split by region, FY2024



Source: Frost & Sullivan Analysis

In FY2024, the cost structure for the washing machine reflects a focused allocation toward material expenses. Glass components represent approximately 3.0 – 5.0% of the total washing machine cost, reflecting their role in the appliance's design and functionality, particularly in the door and display areas. [5]

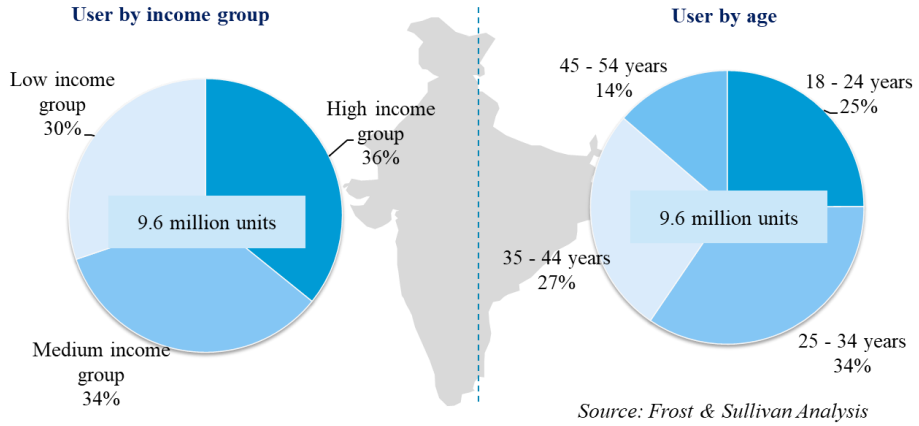
[5] *Please note that the material cost for the washing machine is assumed to be 40% of the total average product price.*

4.5.5. Market segmentation by demography

The Washing machine market in India displays notable trends across income groups and age demographics. The high-income segment leads sales, accounting for 36%, reflecting strong demand for advanced features and energy efficiency. The medium-income group follows with 34%, indicating a growing middle class aspiring for washing machine ownership. The low-income group holds a 30% share, where the washing machine remains a luxury, albeit with potential for growth due to rising affordability.

By age demographics, young adults (25-34 years) dominate sales at 34%, driven by modern living preferences. Consumers aged 35-44 account for 27%, while the 18-24 age group makes up 25%, showcasing emerging demand among students and first-time homebuyers. Lastly, those aged 45-54 represent 14%, suggesting stable ownership levels as washing machines become a standard household feature.

Chart 4.22: Indian Washing machine market split by demography, FY2024[6]

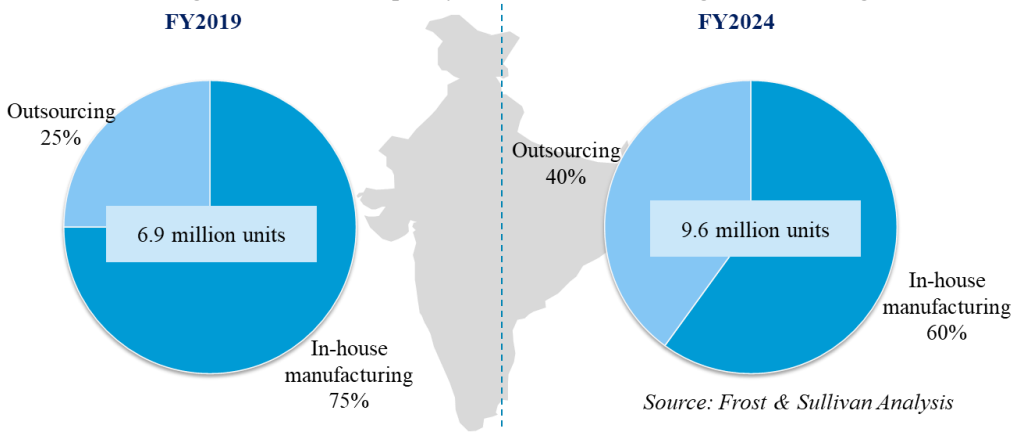


Source: Frost & Sullivan Analysis

4.5.6. In-house manufacturing vs Outsourcing

The Indian washing machine market has seen a significant shift in manufacturing trends over the past few years. In FY2019, in-house manufacturing constituted a dominant share of 75% compared to outsourcing, which accounted for 25%. By FY2024, this share declined to approximately 60%, and projections indicate

Exhibit 4.23: Indian Washing machine market split by in-house manufacturing vs. outsourcing, FY2019 and FY2024



Source: Frost & Sullivan Analysis

a further reduction to around 50% by FY2029E. This shift can be attributed to various factors such as cost optimization, scalability, and focus on core competencies.

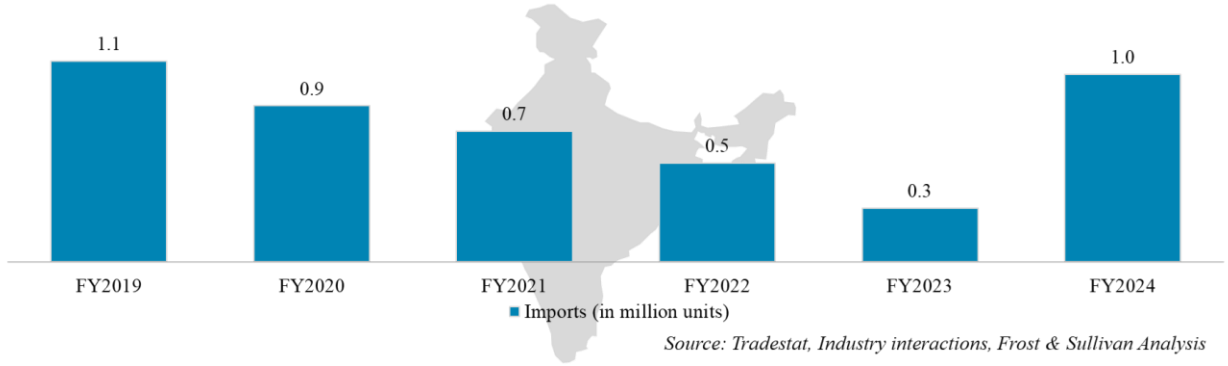
[6] *Note: Low income: Households earning less than INR 200,000 annually, Middle income: Households earning > INR 200,000 and upto INR 1 million annually, High income: Households earning more than INR 1 million annually .*

4.5.7. Import

The trend in washing machine imports in India has shown notable fluctuations. After peaking at 1.1 million units in FY2019, imports declined to 0.3 million units by FY2023. However, a significant rebound occurred in FY2024, with imports rising to 1.0 million units.

This recovery may indicate a resurgence in consumer demand for washing machines, likely fueled by preferences for upgraded features and diversification of brands. The shifting landscape highlights the responsiveness of the market to changing consumer behaviour and economic conditions in India.

Exhibit 4.24: Indian Washing machine import volume in million units, FY2019 – FY2024



Source: Tradestat, Industry interactions, Frost & Sullivan Analysis

4.5.8. Growth Drivers, Market trends & government schemes

Growth drivers

- **Rural Electrification:** The ongoing electrification of rural areas is a significant growth driver for the washing machine market. As electricity becomes more accessible in rural regions, households are more likely to invest in electrical appliances, including washing machines.
- **Rising disposable income:** The market is also driven by key growth factors such as rising disposable incomes, aspirational consumption, urbanization and nuclearization of families, dual-income households, festive season purchases (e.g., Durga Puja, Diwali), and easy financing options.
- **Emerging E-Commerce Brands:** The rise of niche e-commerce brands that focus on home appliances is changing the landscape of the washing machine market. These brands often provide unique features tailored to specific consumer needs, creating new market segments and driving demand.
- **Increased Marketing of Hygiene Features:** Manufacturers are capitalizing on the heightened consumer focus on hygiene by promoting washing machines with advanced cleaning technologies, such as UV sanitization and antibacterial washes, appealing to health-conscious buyers.
- **Enhanced After-Sales Services:** Companies are increasingly offering robust after-sales support, including extended warranties and service packages. This assurance encourages consumers to invest in washing machines, knowing they will receive maintenance and support when needed.
- **Investment in Regional Manufacturing**: The shift towards localized manufacturing, including assembly plants in tier 2 and tier 3 cities, is reducing costs and lead times for consumers. This approach supports faster delivery and potentially lower prices, stimulating demand.

Key trends

- **Customization of Wash Programs:** Consumers are seeking washing machines that offer tailored wash programs to suit different fabric types, load sizes, and water qualities, emphasizing personalized laundry solutions.

- **Adoption of AI and Machine Learning:** Brands are increasingly integrating AI and machine learning into washing machines, enabling automatic adjustments based on load characteristics and user habits, enhancing efficiency and user experience.
- **Focus on Modular Appliances:** The demand for modular appliances is rising, with consumers favoring washing machines that integrate seamlessly with smart home devices, promoting interconnected home ecosystems.
- **Sustainable Production Practices:** Manufacturers are prioritizing eco-friendly products and sustainable production methods, including the use of recycled materials, appealing to the environmentally conscious consumer.
- **Hybrid Models:** The trend towards hybrid washing machines is gaining momentum, combining traditional washing techniques with modern technology to cater to diverse consumer preferences.
- **Localized Marketing Campaigns:** Companies are adopting localized marketing strategies that resonate with regional cultures and preferences, enhancing engagement and driving sales in targeted markets.
- **Subscription-Based Models:** Some brands are exploring subscription-based models, allowing consumers to pay a monthly fee for access to washing machines and services, lowering upfront costs and creating a steady revenue stream for manufacturers.

Government schemes

- **Make in India:** Launched in 2014, this initiative aims to encourage companies to manufacture their products in India. The washing machine industry stands to gain from this initiative as it promotes investment in manufacturing infrastructure and supports local companies.
- **Bureau of Energy Efficiency (BEE) Standards:** The Indian government has established energy efficiency standards for appliances, including washing machines, under the BEE program. These standards encourage manufacturers to produce energy-efficient models, benefitting consumers through lower electricity bills and contributing to environmental sustainability.
- **Digital India Initiative:** The push towards digitalization in India has improved consumer access to information and online shopping. This initiative also supports e-commerce platforms, which are increasingly becoming popular channels for purchasing washing machines.
- **Financial Incentives for Consumers:** Various state governments have launched schemes providing financial incentives or subsidies for consumers to purchase energy-efficient appliances. Such programs aim to encourage consumers to invest in washing machines that are both cost-effective and environmentally friendly.

4.6 Room Air Conditioning (RAC)

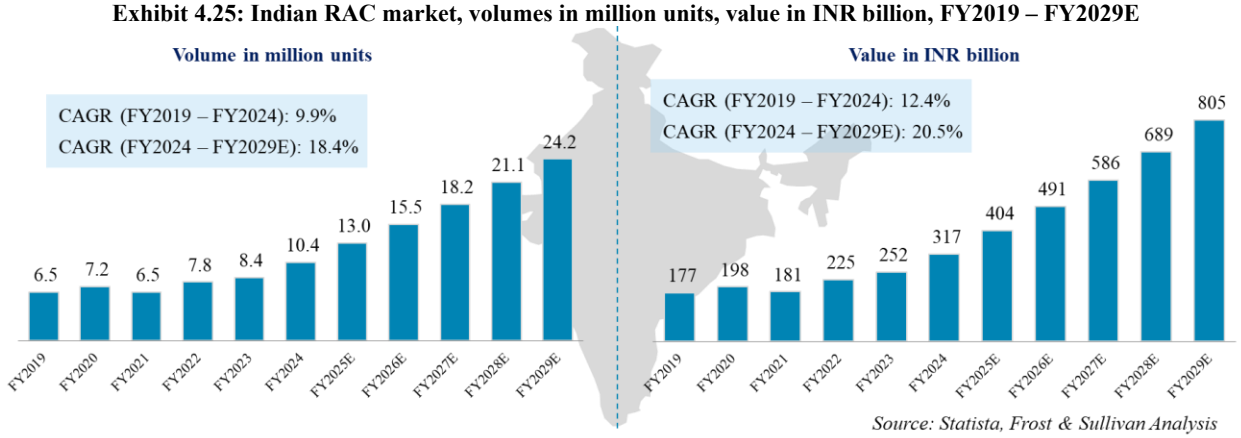
4.6.1. Size of the RAC market

The Indian Room Air Conditioner (RAC) market is experiencing growth due to several key factors, including rising disposable incomes, increasing urbanization, expanded access to electricity, and the availability of consumer-friendly financing options. In response to stringent energy efficiency regulations, the industry has introduced inverter technology, which has significantly lowered operational costs. This technological shift encouraged a growing number of consumers to invest in RACs. With household penetration of RACs still just above 9%, there is substantial potential for expansion in the coming years.

Additionally, shifting consumer preferences are pushing manufacturers to constantly innovate, offering products with enhanced features and greater value. These advancements, along with new technological innovations, have also fueled replacement demand as consumers upgrade their existing units.

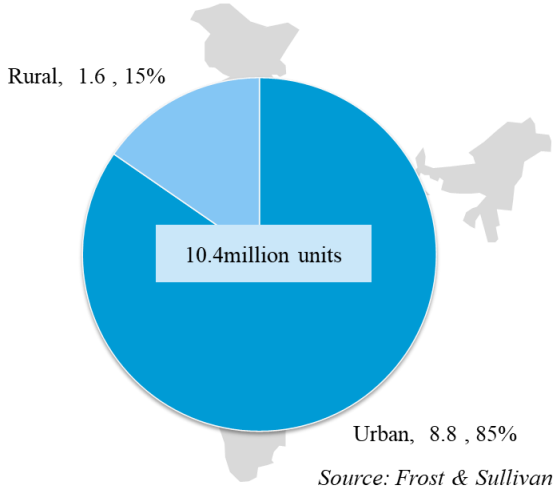
In FY2024, domestic sales of RACs stood at 10.4 million units, with the market expected to expand at a compound annual growth rate (CAGR) of 18.4% through FY2029E. The future growth of RAC demand in urban areas will likely be driven by a focus on affordability, enhanced product features, and improved energy efficiency.

Exhibit 4.25: Indian RAC market, volumes in million units, value in INR billion, FY2019 – FY2029E



Source: Statista, Frost & Sullivan Analysis

Exhibit 4.26: Indian RAC market, Rural vs Urban split, FY2024

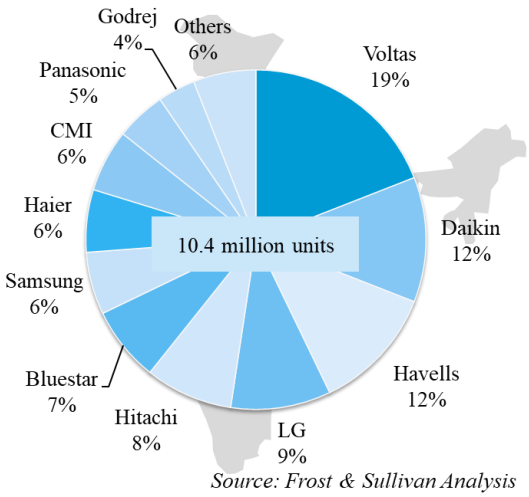


Source: Frost & Sullivan Analysis

4.6.2. Market split by key players

The Indian room air conditioner (RAC) market is highly fragmented, featuring a mix of global brands, local manufacturers, and importers. Established players like Voltas, Daikin, and Havells lead the market, while retail giants such as Reliance, Croma, and Flipkart, along with smaller brands like Onida and Cruise, are launching their own labels to capture a share of this growing industry. Indian consumers are brand-conscious, and word-of-mouth significantly influences their purchasing decisions. As a result, RAC brands invest heavily in advertising and brand building to tap into the underpenetrated market. Anticipated demand is particularly strong in Tier 2 and Tier 3 cities, where rising disposable incomes are driving interest in cooling solutions. A robust distribution and service network will be crucial for ensuring product availability and support in these regions. Additionally, as energy efficiency gains importance, brands focusing on eco-friendly technologies may attract environmentally conscious consumers, creating further opportunities for growth.

Exhibit 4.27: Indian RAC market, split by key players, FY2024

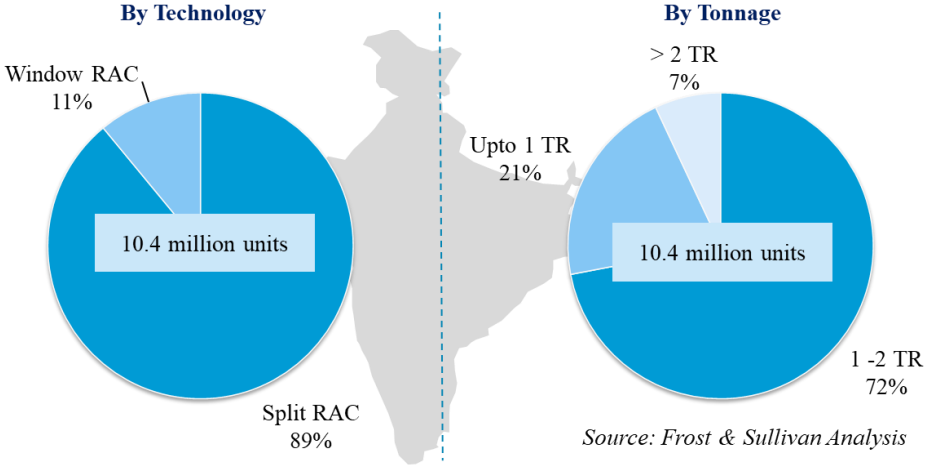


Source: Frost & Sullivan Analysis

4.6.3. Market segmentation by product category

The choice between Split and Window Room Air Conditioners (RACs) hinges on factors such as capacity, design, cost, aesthetics, and operational efficiency. In FY2024, Split air conditioners dominated the market with an impressive 89% share, thanks to their flexible installation options, modern aesthetics, quieter operation, and advanced features like inverter technology.

Chart 4.28: Indian RAC market split by product category, FY2024



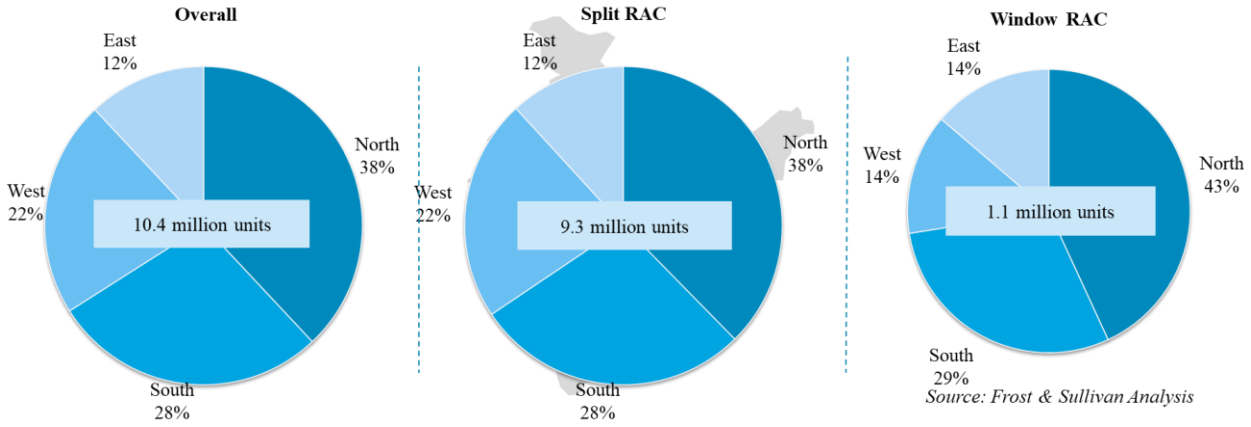
Source: Frost & Sullivan Analysis

Conversely, Window RACs accounted for 11% of the market, primarily favoured for their lower servicing costs and ease of relocation, making them suitable for rental accommodations. Demand for Window RACs is expected to remain stable, comprising 10-11% of the market in the coming years.

4.6.4. Market segmentation by region

The North region represents the largest market for room air conditioners (RACs), making up 38% of the total market, with the South region following at 28%. The West and East regions collectively contribute the remaining 34%. Regional demand is primarily influenced by climate conditions and the rate of urbanization. When looking at product preferences, the North region continues to lead in demand for both Split and Window air conditioners.

Exhibit 4.29: Indian RAC market split by region, FY2024

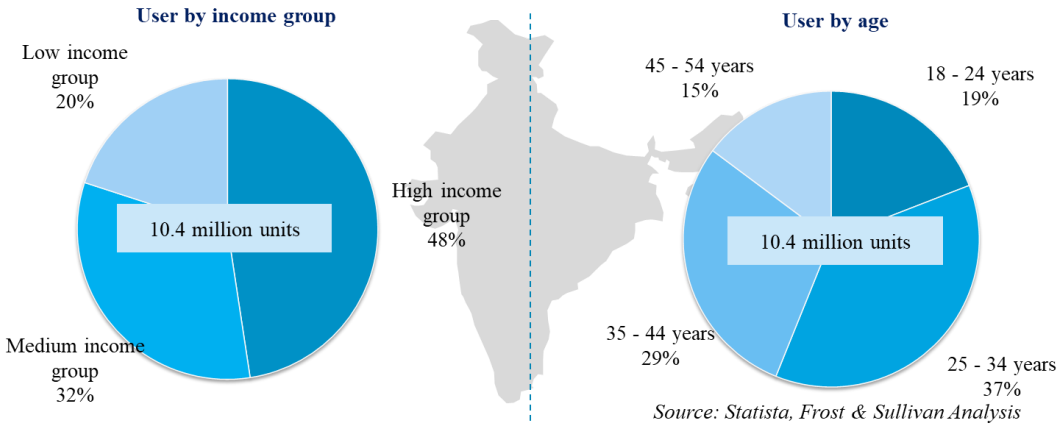


Source: Frost & Sullivan Analysis

4.6.5. Market segmentation by demography

The Room Air Conditioner (RAC) market in India displays notable trends across income groups and age demographics. The high-income segment leads sales, accounting for 48%, reflecting a strong demand for advanced features and energy efficiency. The medium-income group follows with 32%, indicating a growing middle class aspiring for RAC ownership. The low-income group holds a 20% share, where air conditioning remains a luxury, albeit with potential for growth due to rising affordability. By age demographics, young adults (25-34 years) dominate sales at 37%, driven by modern living preferences. Consumers aged 35-44 account for 29%, while the 18-24 age group makes up 19%, showcasing emerging demand among students and first-time homebuyers. Lastly, those aged 45-54 represent 15%, suggesting stable ownership levels as air conditioning becomes a standard household feature.

Exhibit 4.30: Indian RAC market split by demography, FY2024[7]



Source: Statista, Frost & Sullivan Analysis

4.6.6. In-house manufacturing vs Outsourcing

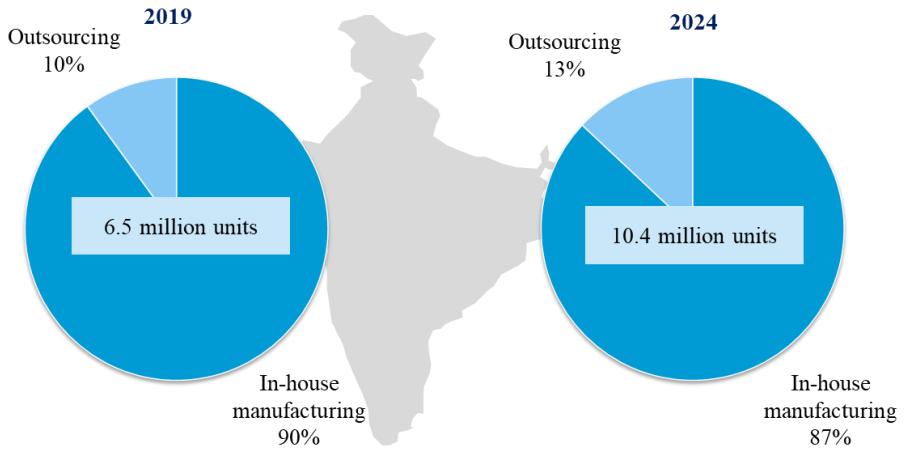
The Original Equipment Manufacturer (OEM) segment plays a pivotal role in India's Room Air Conditioner (RAC) market, valued at INR 297 billion. In alignment with the government's "Atmanirbhar Bharat" initiative, there is an increasing focus on boosting domestic production within the RAC sector. While this shift from imports to local manufacturing is progressing, leading RAC manufacturers have been

[7] *Note: Low income: Households earning less than INR 200,000 annually, Middle income: Households earning > INR 200,000 and upto INR 1 million annually, High income: Households earning more than INR 1 million annually*

actively expanding their in-house production capabilities, producing a significant share of the key components.

In FY2019, about 90% of the 6.5 million RAC units were produced in-house, while 10% was outsourced. By FY2024, the share of in-house production slightly reduced to 87% out of 10.4 million units, reflecting the growing role of contract manufacturers in this space. This is likely to reduce further to approximately 81 – 82%. This highlights a gradual but important trend towards outsourcing, even though in-house production still dominates. Contract manufacturing, specifically white labelling, is gaining traction. In white labelling, the Electronic Manufacturing Services (EMS) provider not only handles production and assembly but also designs the products. This model allows brands to focus on marketing and sales while the EMS partner manages the technical and production aspects. The white-label approach is particularly beneficial for smaller players who lack the resources for setting up in-house production. However, these smaller companies still face significant challenges in establishing domestic manufacturing capabilities.

Exhibit 4.31: Indian RAC market, split by in-house manufacturing vs. outsourcing, FY2019 and FY2024



Source: Frost & Sullivan Analysis

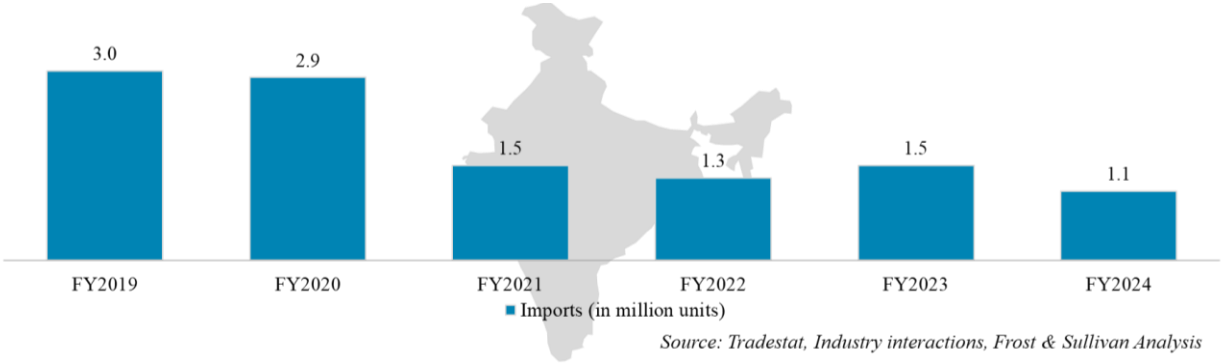
Looking ahead, the white-label contract manufacturing model offers promising potential for scaling up local production, providing an alternative for companies that seek cost-effective solutions without investing heavily in manufacturing infrastructure. This could help further reduce dependency on imports and align with India's goal of self-reliance in the RAC sector. The scope of contract manufacturing is expected to broaden, driven by technological advancements, operational efficiencies, and the increasing demand for customization in the RAC market.

4.6.7. Import

The import trends for Room Air Conditioners (RAC) in India have experienced significant fluctuations, reflecting changes in market dynamics and manufacturing strategies. In FY2019 and FY2020, imports were robust at 3.0 million and 2.9 million units, respectively, driven by rising urbanization and rising disposable incomes. However, imports plummeted to 1.5 million units in FY2021 and further to 1.3 million in FY2022, largely due to the government's "Make in India" initiative and the rise in domestic production.

This decline was also supported by the Production Linked Incentive (PLI) scheme, approved in early 2021, which incentivized local manufacturing and reduced reliance on imports. A slight rebound to 1.5 million units in FY2023 was followed by another decline to 1.1 million in FY2024, indicating strengthening domestic capacities and reduced reliance on imports. The focus on local manufacturing of components, influenced by geopolitical factors and rising import costs, further reinforces this trend.

Exhibit 4.32: Indian RAC import volume in millions, FY2019 - FY2024



Source: Tradestat, Industry interactions, Frost & Sullivan Analysis

4.6.8. Growth Drivers, Market Trends & Government schemes

Growth Drivers

- **Climate Change and Rising Temperatures**: India has been experiencing rising average temperatures due to climate change. With the frequency of heat waves increasing, air conditioners have become a necessity rather than a luxury in many regions, especially during the prolonged summer months.
- **Increasing Urbanization and Real Estate Development**: Urbanization continues at a rapid pace in India, resulting in the construction of new homes, apartments, and commercial complexes. This expansion of urban centers boosts the demand for residential and commercial air conditioning units.
- **Expanding Middle-Class and Aspirational Consumers**: With an expanding middle class and aspirational consumer behaviour, more Indian households are upgrading from traditional cooling devices like fans and coolers to RACs, particularly split AC units.
- **Shift Towards Sustainable Cooling**: Growing awareness around energy conservation and sustainable living has led to higher demand for energy-efficient AC units. Consumers are increasingly inclined to buy inverter ACs, which use less energy and have lower long-term operating costs.
- **Increased Focus on Indoor Air Quality**: Post-pandemic, there is a heightened focus on health and indoor air quality. RACs with built-in air purification systems, anti-bacterial filters, and dehumidifiers are gaining popularity, catering to consumers who are increasingly concerned about indoor air pollution.
- **Boost in E-commerce Sales**: The shift toward online shopping, accelerated by the pandemic, has also transformed the sales channels for air conditioners. With competitive pricing, EMI options, and doorstep delivery, e-commerce platforms are now significant drivers of RAC sales, especially in tier-2 and tier-3 cities.

Market Trends

- **Inverter Technology Domination**: Inverter AC technology, which offers better cooling efficiency with less power consumption, has now overtaken traditional fixed-speed RACs. This shift aligns with both consumer demand for cost savings and government initiatives for energy efficiency.
- **Smart Air Conditioners on the Rise**: Internet of Things (IoT) integration is rapidly becoming a norm in the Indian RAC market. Wi-Fi-enabled, smart air conditioners that can be controlled remotely via apps are growing in demand, particularly among tech-savvy urban customers. Voice-command integration through Alexa and Google Home has also added value to these products.

- **Expansion of Multi-split Systems**: Multi-split air conditioners, which allow multiple indoor units to be connected to one outdoor unit, are becoming more popular in larger homes and commercial buildings due to their space-saving design and flexibility.
- **Sustainable Refrigerants Adoption**: RAC manufacturers are now actively transitioning to eco-friendly refrigerants, such as R32 and R290, in compliance with the government's push toward environmental sustainability. This trend is likely to further accelerate as climate change concerns gain more prominence.
- **Rural Demand and Penetration**: With rising incomes and electrification in rural India, demand for affordable and durable air conditioning solutions is increasing. Brands are also developing rugged models designed for rural conditions, opening up new markets beyond urban centers.
- **Compact and Portable Air Conditioners**: The increasing trend of minimalistic living spaces, especially in urban settings, has led to rising demand for compact and portable air conditioners that can efficiently cool smaller spaces.

Government Schemes and Regulations

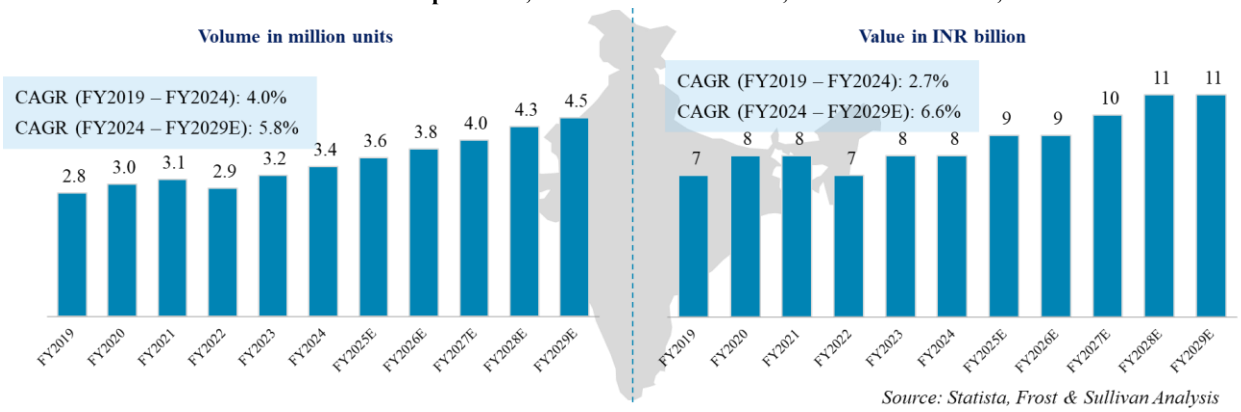
- **Production Linked Incentive (PLI) Scheme**: The Indian government has introduced a PLI scheme specifically for the white goods sector, which includes air conditioners. This scheme offers financial incentives to boost domestic manufacturing, reduce imports, and promote self-reliance in components like compressors and other AC parts.
- **Phased Manufacturing Programme (PMP)**: The PMP is gradually increasing duties on key RAC components such as compressors and printed circuit boards (PCBs) to reduce reliance on imports and promote local manufacturing. The program incentivizes Indian manufacturers to build an integrated supply chain for air conditioner components.
- **Bureau of Energy Efficiency (BEE) Star Labeling**: In line with energy efficiency goals, the BEE's star rating program encourages consumers to buy RACs with higher energy efficiency ratings. The government has also raised minimum energy performance standards (MEPS), which is pushing manufacturers to introduce more energy-efficient models.
- **National Cooling Action Plan (NCAP)**: The NCAP, launched by the Ministry of Environment, Forest, and Climate Change, focuses on reducing cooling energy consumption and promoting green alternatives. The plan aims to reduce refrigerant demand, cut cooling energy requirements, and boost energy efficiency in the RAC sector by 2037-38.
- **Smart Cities Mission**: Under the Smart Cities Mission, cooling infrastructure in urban areas is being upgraded. This modernization includes energy-efficient air conditioning for residential, commercial, and public buildings, which is boosting demand for advanced RAC technologies.
- **Import Duty Revisions**: The government has progressively raised customs duties on finished RAC units and certain key components, making imports more expensive. This move supports domestic production, especially under the Atmanirbhar Bharat (Self-reliant India) initiative, which aims to make India a global hub for RAC manufacturing.
- **Incentives for Green Building Projects**: The government's focus on green buildings and sustainable urban development provides subsidies and incentives for buildings using energy-efficient RAC systems. This trend is pushing commercial and residential projects to adopt advanced cooling systems with low environmental impact.

4.7 Induction cooktop

4.7.1. Size of Induction cooktop market

Cooktops, commonly known as cooking stoves, serve as essential appliances in kitchens. An induction cooktop, in particular, is a modern device that utilizes electromagnetic induction to heat compatible cookware directly. This appliance features a sleek glass-ceramic surface, induction coils, a control panel, and built-in safety elements. Induction cooking stands out for its energy efficiency, fast heating, precise temperature regulation, and enhanced safety features. As a result, induction cookers have become increasingly popular among households that prioritize innovative and efficient cooking solutions.

Exhibit 4.33: Indian Induction cooktop market, volumes in million units, value in INR billion, FY2019 – FY2029E

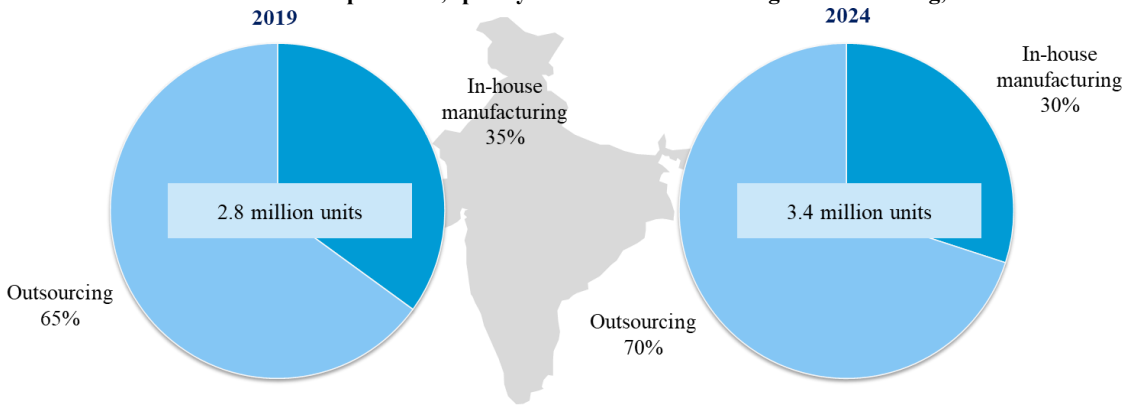


Source: Statista, Frost & Sullivan Analysis

4.7.2. Market segmentation: In-house vs Outsourcing

There has been a significant shift from in-house manufacturing to outsourcing. In FY2019, in-house manufacturing accounted for 35% of the total units, while outsourcing contributed 65% increasing to approximately 70% in FY2024 and likely to increase further in the coming years. The data indicates that while just 30% of induction cooktops in India are produced in-house, this segment generates 56% of the market's value.

Exhibit 4.34: Indian Induction cooktop market, split by in-house manufacturing vs. outsourcing, FY2019 and FY2024



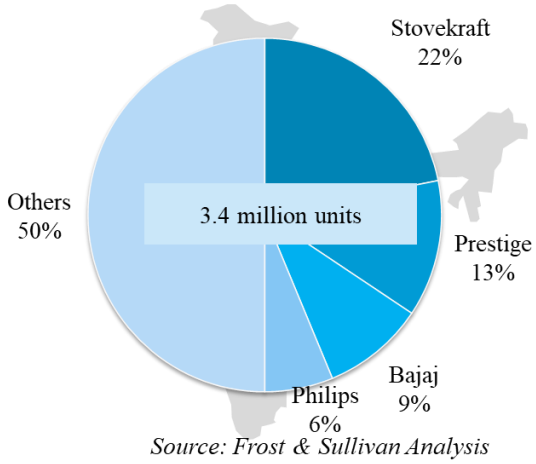
Source: Frost & Sullivan Analysis

In contrast, outsourced production, which constitutes 70% of the volume, accounts for only 44% of the market value. This suggests that in-house production is more value-driven, with in-house cooktops likely sold at higher price points, potentially due to superior quality, stronger brand perception, or tighter control over production. Meanwhile, outsourced units, though produced in greater numbers, may be positioned within a lower price range.

4.7.3. Market split by key players

The induction cooktop market in India is served by both domestic and international players, with competition primarily driven by factors such as product differentiation, capacity, advanced features, and pricing strategies. Companies are focusing on expanding their market reach and incorporating new technologies to enhance profitability and gain a larger market share. Some manufacturers are also introducing eco-friendly and energy-efficient induction cooktops, featuring innovations like multiple burners, noiseless operation, and touchscreen controls. Key players, including Stovekraft, Prestige, Bajaj, and Philips, collectively hold around 50% of the Indian induction cooktop market.

Exhibit 4.35: Indian Induction cooktop market, split by key players, FY2024



Source: Frost & Sullivan Analysis

4.7.4. Growth Drivers, Market Trends & Government schemes

Growth Drivers

- **Rising Urbanization and Modern Kitchens**: The increasing trend of urbanization has led to the demand for modern kitchen appliances. Induction cooktops, with their sleek design and ease of use, are becoming a staple in urban households, particularly in modular kitchens.
- **Energy Efficiency and Cost Savings**: With growing awareness of energy conservation, induction cooktops are favored for their energy-efficient operation, as they convert electricity directly into heat. This has encouraged consumers to shift from traditional gas stoves to induction cooktops, offering long-term cost savings.
- **Safety Concerns**: The risk of gas leaks and open flames with traditional stoves has prompted safety-conscious households to switch to induction cooktops, which have inbuilt safety features like auto-shutoff and cool-to-touch surfaces.
- **Electrification and Access to Power**: Improved electrification in rural and semi-urban areas has expanded the market for induction cooktops, as consumers in these regions now have access to reliable electricity to operate such appliances.
- **Rise of E-Commerce and Easy Financing Options**: The availability of a wide variety of induction cooktops on e-commerce platforms, coupled with financing options like easy monthly EMIs, has boosted the penetration of these appliances, especially among middle-income groups.
- **Changing Consumer Lifestyles**: With increasingly busy lifestyles, many consumers are opting for faster cooking methods. Induction cooktops, known for their rapid heating times, have gained traction among working professionals and young families looking for time-saving kitchen solutions.

Market Trends

- **Growing Preference for Multi-Zone Cooktops**: Consumers are showing a rising interest in multi-zone induction cooktops, which allow for multiple dishes to be cooked simultaneously. This trend is driven by the need for efficient meal preparation in larger households.
- **Smart and IoT-Enabled Cooktops**: The integration of smart technologies, including IoT (Internet of Things), into induction cooktops is a growing trend. These advanced models allow users to control cooking remotely, monitor power consumption, and receive cooking tips through apps, enhancing convenience.
- **Premiumization and Aesthetic Appeal**: As consumers increasingly seek high-end kitchen appliances that match their modern décor, premium induction cooktops with aesthetic designs, touch controls, and glass-ceramic surfaces are gaining popularity.
- **Focus on Portability and Compactness**: With space constraints in urban kitchens, there is a demand for portable and compact induction cooktops that can be easily moved and stored, without sacrificing functionality.
- **Increased Adoption in Rural Areas**: The induction cooktop market is witnessing growth in rural and semi-urban areas due to rising disposable incomes, improving infrastructure, and the convenience of electricity over LPG. Many households are adopting these cooktops as a supplement or alternative to traditional stoves.
- **Rising Demand for Hybrid Cooking Solutions**: Consumers are seeking flexibility in their cooking appliances. This has led to a rise in hybrid solutions that combine gas burners with induction zones, catering to those who want the best of both worlds.

Government schemes and regulations

- **Pradhan Mantri Ujjwala Yojana (PMUY) - Clean Energy for All**: While primarily aimed at providing LPG connections to rural households, the PMUY has also highlighted the need for cleaner cooking solutions, including induction cooktops, as part of the broader clean energy push.
- **Make in India Initiative**: The government's "Make in India" initiative has encouraged domestic manufacturing of induction cooktops. Several manufacturers have set up or expanded production facilities, benefiting from subsidies and incentives for locally produced goods, reducing dependence on imports.
- **Subsidized Power Supply in Rural Areas**: Government programs aimed at providing subsidized electricity in rural areas are creating an environment conducive to the adoption of induction cooktops, which require a stable power supply. This is leading to increased penetration in previously underserved markets.
- **GST Reduction on Energy-Efficient Appliances**: The Indian government has provided tax benefits in the form of lower GST rates for energy-efficient appliances like induction cooktops, making them more affordable for a larger segment of the population.

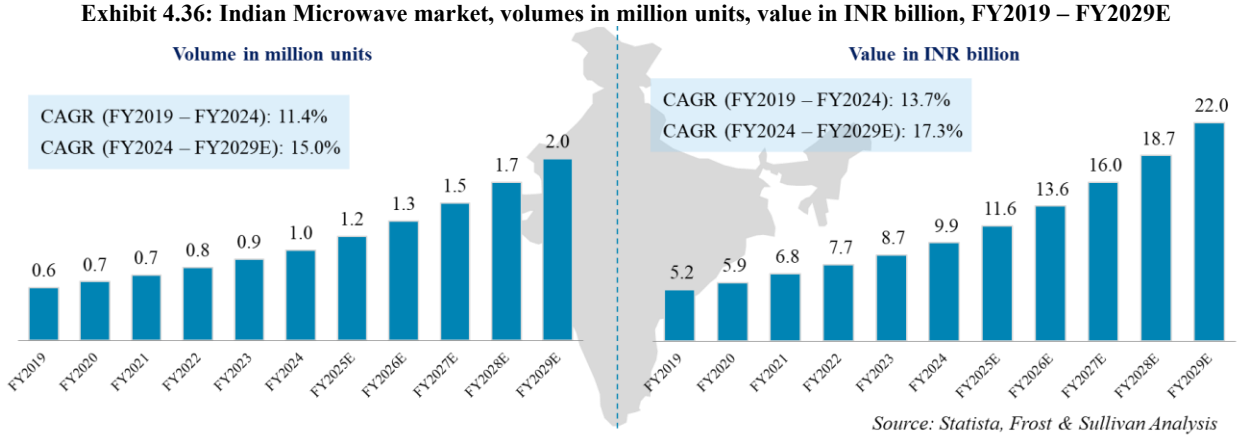
4.8 Microwave

4.8.1. Size of microwave market

In FY2024, the Microwave Oven market in India generated revenue of approximately INR 9.9 billion. The market is expected to grow at a compound annual growth rate (CAGR) of 17.3% over the period from

FY2024 to FY2029E. Looking ahead, the market volume is projected to reach 2.0 million units by FY2029E. The growing demand for microwave ovens in India can be attributed to the expanding middle class, which increasingly seeks convenient cooking solutions, particularly in urban areas.

Exhibit 4.36: Indian Microwave market, volumes in million units, value in INR billion, FY2019 – FY2029E

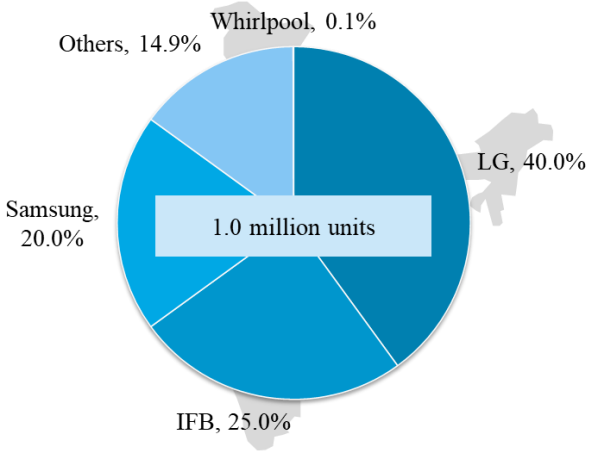


Source: Statista, Frost & Sullivan Analysis

4.8.2. Market split by key players

The Indian microwave market displays a competitive landscape with a total of 1.0 million units sold in FY2024.

Exhibit 4.37: Indian Microwave market, split by competition, FY2024



Source: Frost & Sullivan Analysis

LG leads the market with a significant share of 40%, followed by IFB at 25%. Samsung holds 20% of the market, while Whirlpool accounts for 0.1%. The remaining 14.9% is attributed to various other brands. This distribution emphasizes the dominance of LG, Samsung and IFB, while also highlighting the presence of Whirlpool in this market.

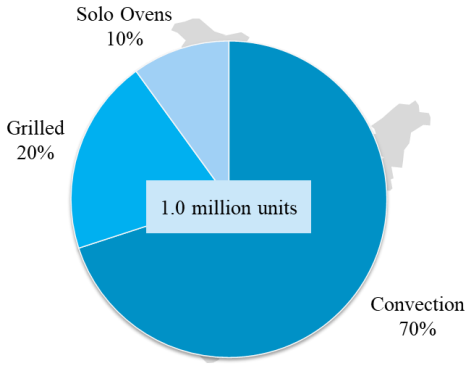
4.8.3. Market segmentation by product category

In FY2024, the Indian microwave oven market recorded sales of 1.0 million units, with convection ovens leading at 70% of total sales. Their popularity stems from versatility, enabling functions like baking, grilling, and reheating, making them ideal for modern households.

Grilled microwaves accounted for 20% of sales, attracting consumers focused on grilling features. Solo ovens made up the remaining 10%, appealing to budget-conscious users or those with simpler cooking needs. This distribution highlights a growing preference for multifunctional kitchen appliances, especially in urban areas prioritizing convenience and efficiency.

Toughened glass constitutes a small but significant portion of the Bill of Materials (BOM) in home appliances. For instance, in microwaves, toughened glass makes up approximately 2.5% to 4% of the overall cost. This component adds durability and heat resistance, enhancing the product's overall functionality and consumer appeal. While the percentage might appear modest, toughened glass remains a crucial element in ensuring the quality and safety of the appliance, which can be a factor in the product's market positioning and pricing strategy

Chart 4.38: Indian Microwave market split by product types, FY2024



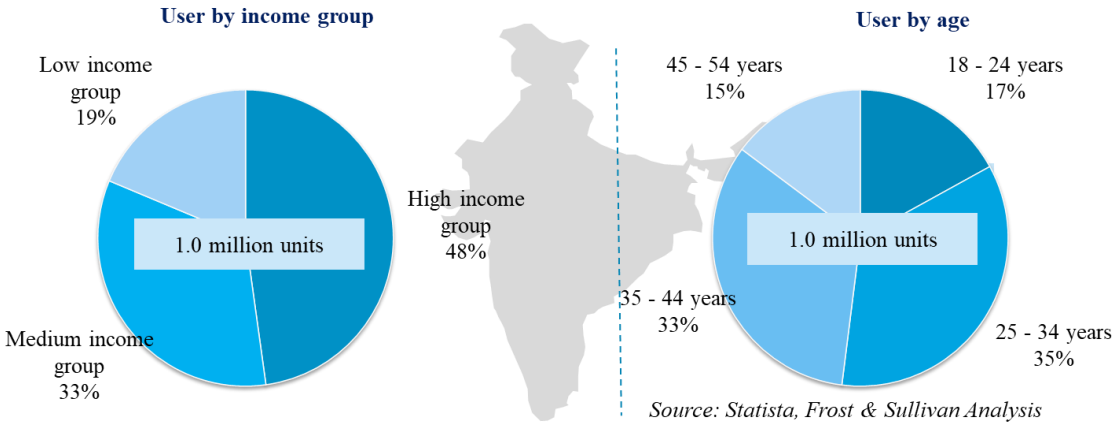
Source: Desk research, Frost & Sullivan Analysis

4.8.4. Market segmentation by demographics

In the Indian microwave oven market, the total unit sales amount to 1.0 million. When analyzing the distribution by income group, 48% of users fall into the high-income bracket, while 33% belong to the medium-income segment.

The remaining 19% of microwave users are from the lower-income group. Regarding the age-based distribution of microwave oven users, the largest demographic is the 25 - 34 age group, which constitutes 35% of the market. This is followed by users aged 35- 44, making up 33% of the market. Younger users, aged 18 - 24, represent 17% of the market, while the oldest group, those aged 45 - 54 and above, account for 15%.

Chart 4.39: Indian Microwave market split by demographics, FY2024[8]



Source: Statista, Frost & Sullivan Analysis

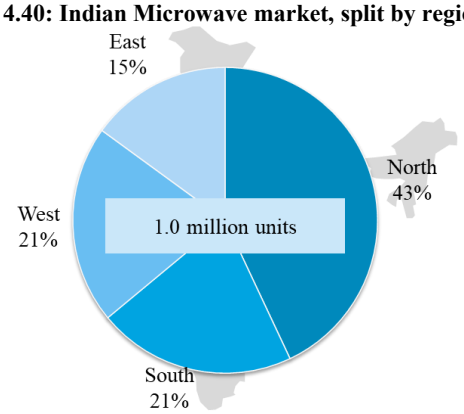
[8] *Note: Low income: Households earning less than INR 200,000 annually, Middle income: Households earning > INR 200,000 and upto INR 1 million annually, High income: Households earning more than INR 1 million annually*

This proportion highlights the importance of glass in the microwave's design, particularly for the door and interior components.[9]

4.8.5. Market segmentation by region

The domestic sales of microwave ovens in India reveal significant regional variation, with North India leading the market, accounting for 43% of the total 1.0 million units sold. Both South and West India contribute equally with 21% each, while East India holds the smallest share at 15%. This distribution suggests that microwave ovens have gained more traction in the northern part of the country, possibly due to higher urbanization or income levels.

Exhibit 4.40: Indian Microwave market, split by region, FY2024



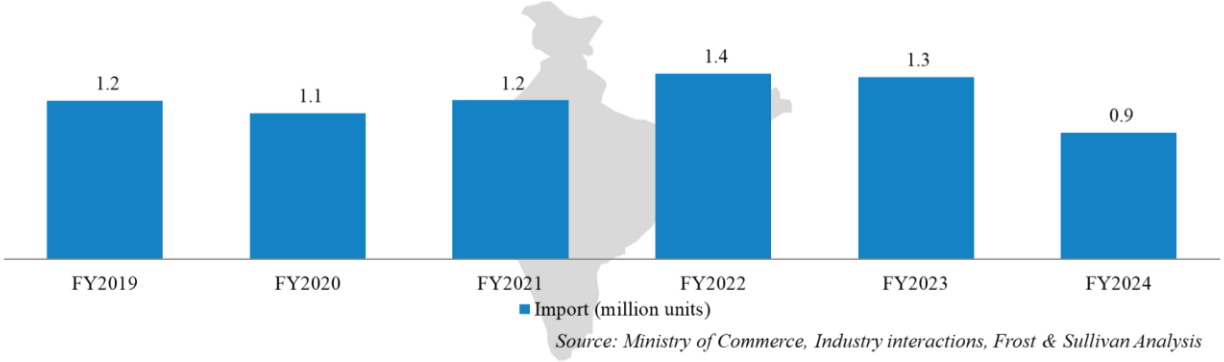
Source: Desk research, Frost & Sullivan Analysis

The relatively lower share in the east indicates growth potential, as increasing awareness and improving economic conditions could drive future demand in this region. Meanwhile, the even distribution between the southern and western regions points to stable demand and gradual market development in these areas.

4.8.6. Import and export

The import and export trends for microwave ovens in India over the past six fiscal years reveal a significant reliance on imported products to meet domestic demand. From FY2019 to FY2024, India's export of microwaves remained consistently low at 0.02 million units, with a slight dip to 0.01 million units in FY2024. This indicates that India's production of microwave ovens is primarily focused on fulfilling internal consumption rather than expanding into international markets.

Exhibit 4.41: Indian Microwave import volume in million units, FY2019 - FY2024



Source: Ministry of Commerce, Industry interactions, Frost & Sullivan Analysis

On the other hand, imports have played a critical role in the Indian microwave oven market. The import volume peaked in FY2022 at 1.4 million units, reflecting the growing demand for these appliances during the post-pandemic recovery, as more households sought convenient cooking solutions. However, by

[9] *Please note that the material cost for the microwave is assumed to be 40% of the total average product price*

FY2024, imports fell to 0.9 million units, suggesting a shift either toward increased domestic production capacity, changing consumer preferences, or possibly due to supply chain adjustments.

4.9 Shift of manufacturing from China to India

4.9.1. Shift of Manufacturing from China to India by Global White Goods Players

- **China +1 strategy:** Many companies are looking to reduce their dependence on China, especially after the supply chain disruptions caused by the COVID-19 pandemic and rising geopolitical tensions, such as the U.S.-China trade war. Diversifying manufacturing locations helps mitigate risks associated with over-reliance on a single country.
- **Incentives from the Indian Government:** The Indian government's **Production Linked Incentive (PLI)** schemes for various sectors, including electronics and white goods, have attracted global manufacturers to set up production facilities in India. These schemes provide financial incentives based on incremental sales and manufacturing capacity expansions, making India an attractive destination for foreign investment.
- **Proximity to Key Markets:** India has a growing domestic market for white goods, driven by rising disposable incomes, urbanization, and electrification in rural areas. By manufacturing in India, global players can cater to this demand while also serving neighbouring markets like Southeast Asia, Africa, and the Middle East.
- **Geopolitical and Trade Considerations:** Increasing trade frictions between China and key markets like the U.S. and Europe have encouraged global companies to explore alternative manufacturing bases. India, with its stable political environment and favorable trade policies, has emerged as a potential beneficiary.
- **Supply Chain and Logistics Advantages:** India's growing manufacturing ecosystem, improving infrastructure (ports, roads, and railways), and focus on digitization are also encouraging global players to establish local production bases.

4.9.2. The Make in India Initiative: Driving Domestic Manufacturing Growth

Launched in 2014, the Make in India initiative aims to establish India as a global manufacturing hub by enhancing domestic capabilities. This initiative focuses on generating employment, fostering innovation, and developing skills to drive economic growth. A key component of this effort is the Public Procurement (Preference to Make in India) Order, introduced by the Department for Promotion of Industry and Internal Trade (DPIIT) in June 2017. This order incentivizes domestic production by prioritizing government procurement of Indian-made products, supporting a self-reliant industrial base.

Eligibility Criteria:

- **Business Entity:** The applicant must be either an Indian or foreign company with established manufacturing or service operations within India.
- **Local Value Addition:** The products must undergo a minimum of 20% value addition in India.
    - **Class-I Local Supplier:** A supplier or service provider whose product or service has 50% or more local content.
    - **Class-II Local Supplier:** A supplier or service provider whose local content is more than 20% but less than 50%.

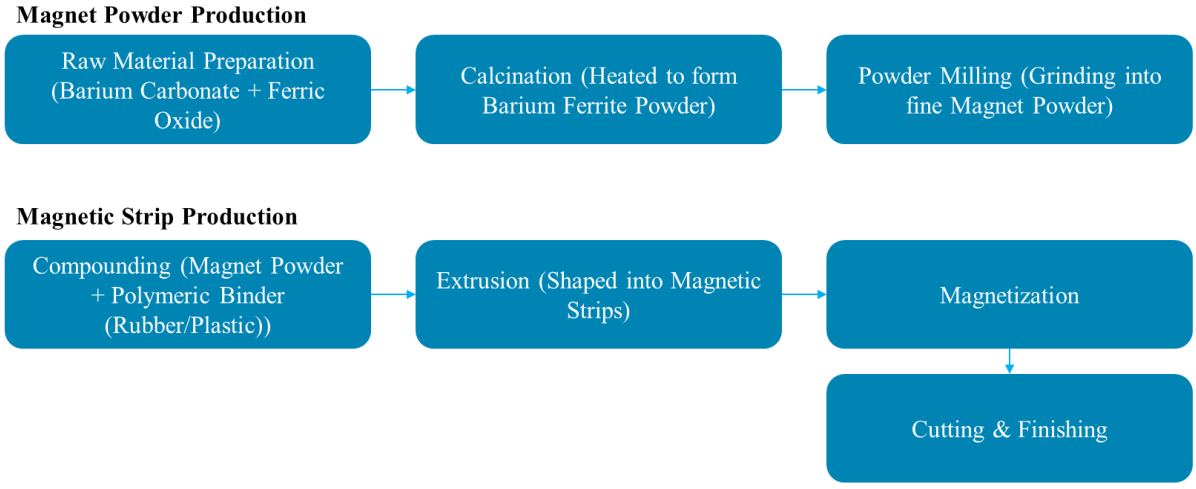
5. MARKET ASSESSMENT FOR KEY COMPONENTS USED IN APPLIANCES

5.1 Brief manufacturing process of the polymer extruded and toughened glass products

Products of interest for this industry report are some of the critical components that are used in consumer durables such as Refrigerators, Commercial Refrigerators such as Visi Coolers and Deep Freezers, Washing machines, Microwaves, Cooktops, etc. These components are:

- **Polymer extruded products:** These products include
    a. Gaskets that are used in Refrigerator doors
    b. Rigid profiles that are used for trims in refrigerator shelves, transparent profiles, door profiles in both household and commercial refrigerators as well as various profiles used in commercial visi coolers and deep freezers,
    c. HIPS / ABS sheets that are used in manufacturing Refrigerator inner mould
- **Toughened glass:** These products include
    a. Glass for refrigerator shelf and door (digitally printed glass)
    b. Top and front glass for washing machines
    c. Printed front glass and back for microwaves
    d. Glass for cooktops
    e. Glass for other products such as room air conditioner front panel, water dispenser front panel etc.
- **Magnet:** This includes the production of Barium Ferrite powder or magnet powder and magnetic strips which are made through extrusion of the magnetic powder-based compound.

Exhibit 5.1: Production Process Flow for Magnet Powder and Magnetic Strips



Source: Stakeholder interactions, Frost & Sullivan Analysis

Ajay Poly Ltd. has established a strong cost advantage by focusing on cost optimization through strategic investments in infrastructure, backward integration, and operational excellence. The Company's manufacturing processes are designed to meet the precise and complex requirements of the Indian consumer durables market, ensuring consistent quality and adherence to high standards.

As a leading manufacturer of PVC compounds in India, Ajay Poly leverages advanced techniques to produce materials that meet global standards, offering excellent aesthetics, colour fastness, and application-specific properties tailored to the needs of modern appliances. This capability positions the Company as a critical player in supporting the growing demand for durable and high-quality products in the Indian market.

With the expansion of the Indian consumer durables sector, there is an anticipated surge in demand for engineering plastics and toughened glass, driven by consumer expectations for superior performance and aesthetic appeal. Industry experts predict that manufacturers like Ajay Poly Ltd. are poised to benefit from these favourable trends, contributing to a robust supply chain that supports the production of reliable, locally sourced components, which are essential for the production of modern appliance.

5.1.1. Polymer extruded products

Polymer extrusion is a manufacturing process in which raw plastic materials, usually in the form of pellets or powders, are melted and formed into continuous shapes by forcing the molten polymer through a specially designed mould or forming tool. This process is widely used to produce a variety of products, from flexible soft seals and rigid profiles to sheets of High Impact Polystyrene (HIPS) or Acrylonitrile Butadiene Styrene (ABS). Ajay Poly Ltd. is also one of the leading manufacturers of TPV and TPE extruded profile products, providing solutions for a range of industries, including automotive, consumer goods, and home appliances.

A. Gaskets for refrigerator doors

Refrigerator door gasket assemblies are flexible sealing components designed to create an airtight seal between the refrigerator door and its main body. These gaskets are essential for maintaining energy efficiency, preserving food quality, and optimizing appliance performance. These gaskets are essential for maintaining the refrigerator's internal temperature, preventing warm air infiltration, and enhancing energy efficiency.

Typically made from soft PVC or thermoplastic elastomers, these gaskets are engineered for flexibility, durability, and long-term performance. They are specifically designed to withstand repeated compression and retain their shape over time, ensuring a consistent and reliable seal throughout the appliance’s lifespan.

Key applications and features include:

- Applications: Widely used in household refrigerators, commercial refrigeration units, industrial cold storage, and portable cooling devices.
- Material: Made from flexible polymer materials such as soft PVC or thermoplastic elastomers.
- Magnetic Strips: Embedded magnetic strips provide a tight, secure closure.
- Customizable Design: Available in various sizes and shapes to fit different refrigerator models.
- Energy Efficiency: Helps minimize air leakage, maintain stable temperatures, and reduce energy usage.
- Food Preservation: Ensures optimal insulation, keeping food fresh for longer periods.

These gasket assemblies play a critical role in modern refrigeration, combining functionality with energy-saving benefits to meet the demands of both household and commercial applications.

The manufacturing process for these soft seals involves a series of precise steps, starting from the preparation of raw materials to the final assembly of the magnetic strip and sealing components. The following is a list of processes required to manufacture a Soft seals.

- Raw materials mixing
- Pelletisation

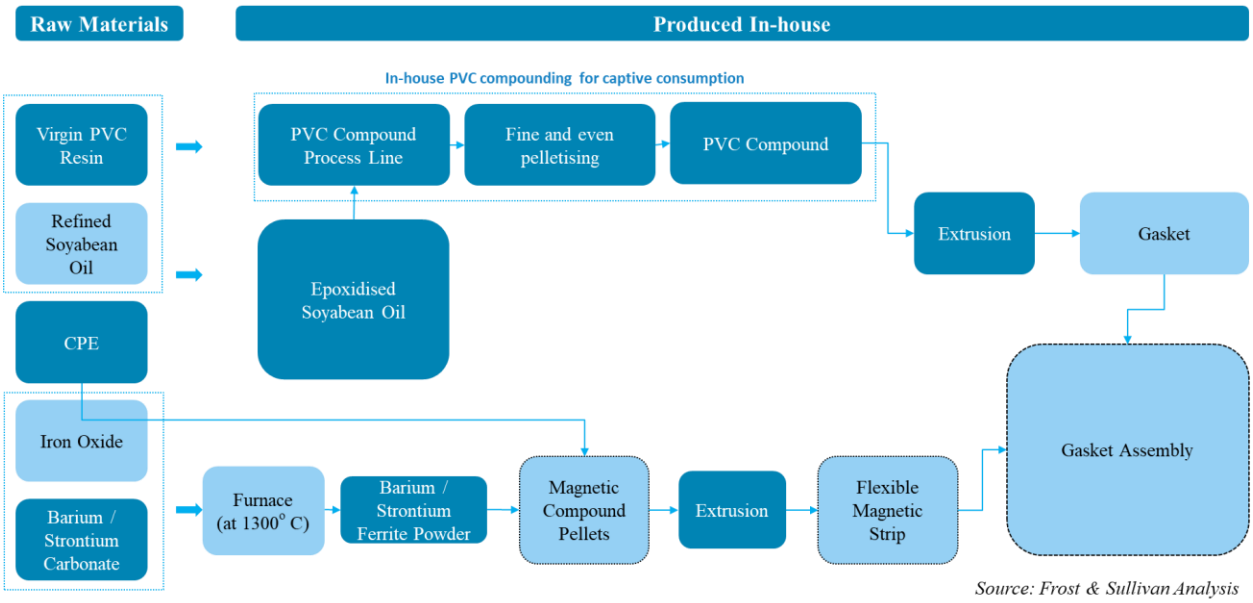
- Extrusion
- Magnet powder preparation
- Magnetic strip extrusion
- Cutting of gasket and magnetic strip insertion
- Gasket joining

The production process begins with the preparation of raw materials, including Virgin PVC Resin, Soya Bean Oil, CPE, Iron Oxide, and Barium/Strontium Carbonate. These raw materials undergo in-house processing where they are transformed into intermediate products.

The PVC Compound Process Line handles PVC Resin, which is compounded with other additives to produce customized PVC Compound Pellets with specific colour and physical properties. Simultaneously, Barium/Strontium Ferrite Powder is compounded to create Magnetic Compound Pellets, which serve as the basis for magnetic components.

These compounds then move to the extrusion stage, where PVC Compound Pellets are processed into durable Gaskets, and Magnetic Compound Pellets are extruded into Flexible Magnetic Strips. Finally, the gaskets and magnetic strips are integrated during the assembly stage, resulting in finished Gasket Assemblies, ready for industrial or consumer use. This integrated production approach emphasizes backward integration, ensuring in-house control of all critical manufacturing processes for gaskets, magnetic strips, and related components.

Exhibit 5.2: Process flow, manufacturing process for gaskets for refrigerator door:



Source: Frost & Sullivan Analysis

The manufacturing process for refrigeration door gaskets begins with mixing raw materials such as PVC resin, Epoxidised Soyabean Oil (ESO), pigments, and various additives. This blend is carefully prepared to ensure uniformity and provide the gasket with the necessary flexibility, durability, thermal stability, and desired color. The mixture is then processed through pelletisation, where it is heated, shaped into small, uniform pellets, and cooled. These pellets are easy to handle and ensure consistency during further processing.

In the extrusion stage, the pellets are melted and pushed through a die to create gasket profiles with precise dimensions. For gaskets requiring magnetic properties, magnetic strips are embedded during or immediately after extrusion to enable airtight sealing with refrigeration doors. Once the profiles are

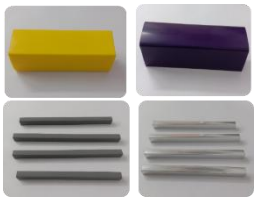
extruded and cooled, they are cut, joined, or welded into complete gaskets tailored to the door's specifications.

The final stage involves assembling and inspecting the gaskets to ensure they meet dimensional accuracy and performance requirements. Rigorous quality checks are conducted to confirm the gaskets' sealing efficiency before they are packaged and dispatched for use in refrigeration doors. This streamlined process ensures the production of high-quality gaskets that meet industry standards.

B. Rigid profiles

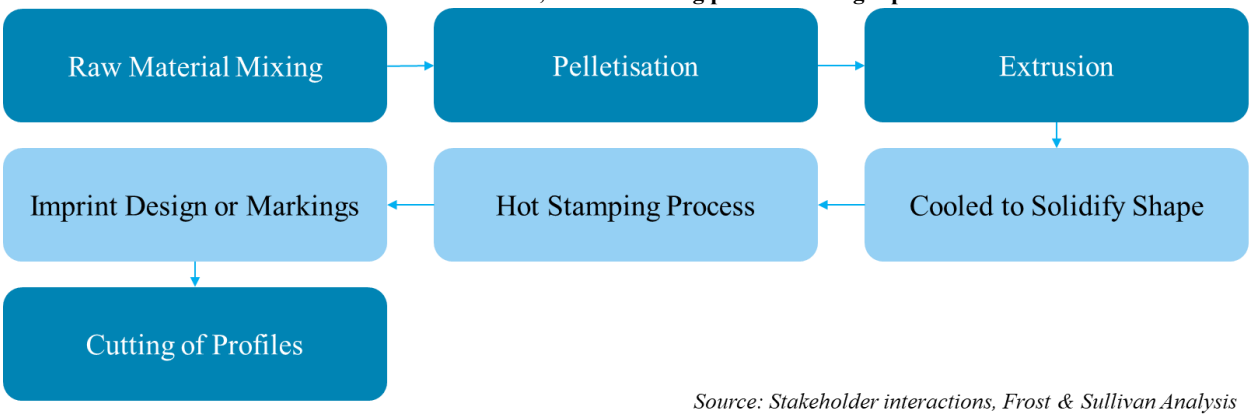
Rigid profiles are used for trims, transparent profiles, door profiles in both household and commercial refrigerators as well as various profiles used in commercial visi coolers and deep freezers, for their durability, lightweight properties, and ability to be formed into specific shapes and profiles.

The extrusion process allows for the creation of components like frames, channels, panels, and profiles that are essential for the efficient construction and functioning of commercial refrigerators, freezers, and cold storage units. Common materials used in these extrusions include PVC, acrylonitrile butadiene styrene ("ABS"), high-impact polystyrene ("HIPS"), and polycarbonate, which offer high strength, thermal insulation, and resistance to moisture and chemicals.



The process for manufacturing rigid profiles involves several key steps, starting with preparation, pelletisation, and extrusion, which remain consistent with the process used for Gaskets. However, unlike gaskets, rigid profiles do not include the insertion of a magnetic strip, as their tougher material properties do not require the additional component for sealing. After extrusion, the profiles are cooled to solidify their shape, and then undergo a hot stamping process. During hot stamping, the profiles are subjected to heat and pressure to imprint specific designs or markings, ensuring they meet the required specifications. Following this, the profiles are precisely cut to the desired length using post-extrusion cutting techniques. This step ensures that the profiles are accurately sized for their intended applications, maintaining uniformity and precision. The result is a durable, rigid profile that can be used in various structural applications, with a focus on providing strength and stability without the need for the magnetic sealing feature found in softer profiles.

Exhibit 5.3: Process flow, manufacturing process for Rigid profiles



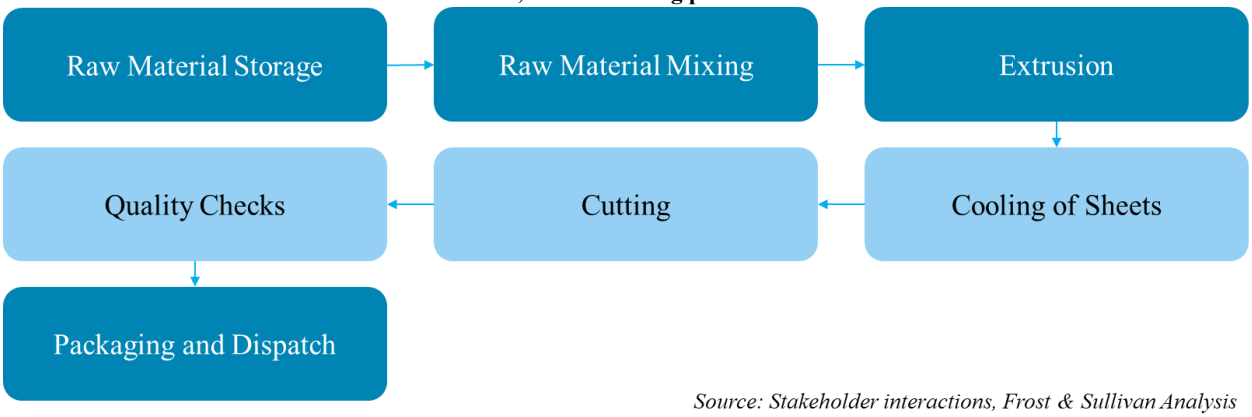
Source: Stakeholder interactions, Frost & Sullivan Analysis

C. Extruded sheets

HIPS/ABS sheets are commonly used materials in the manufacturing of home appliances, especially refrigerators. This material offers high impact resistance, durability, and easy processing, making them suitable for creating various appliance components. In the context of refrigerator manufacturing, HIPS/ABS

sheets are particularly valuable due to their excellent surface finish, structural stability, and ability to withstand regular wear and tear.

Exhibit 5.4: Process flow, manufacturing process for HIPS/ ABS sheets



Source: Stakeholder interactions, Frost & Sullivan Analysis

These sheets can be utilized for both interior and exterior parts of refrigerators, such as door liners, shelves, and trays. The production process for HIPS/ABS sheets involves several stages, each contributing to the quality and performance of the final product. The manufacturing process for HIPS/ABS sheets begins with stringent storage of raw materials, like styrene and butadiene-styrene-acrylonitrile polymers, in climate-controlled environments to prevent degradation. After quality checks, these polymers are mixed with additives such as UV stabilizers and impact modifiers to ensure uniform mechanical properties. This blend is heated in an extruder, forming a molten mass that is shaped into a continuous sheet through a die. Cooling rollers then solidify the sheet, preserving its structural integrity and smooth finish, essential for appliance components. Finally, precision cutting tools size the sheets to exact specifications, ensuring a seamless fit during assembly, which is crucial for effective insulation and durability in applications like refrigerator interiors.

5.1.2. Toughened Glass

Toughened Glass: Known for its strength, fragmentation (for safety), commonly used in appliances such as refrigerator shelves, refrigerator doors, visi cooler doors, microwave oven doors, gas cooktop hobs and washing machine lids.

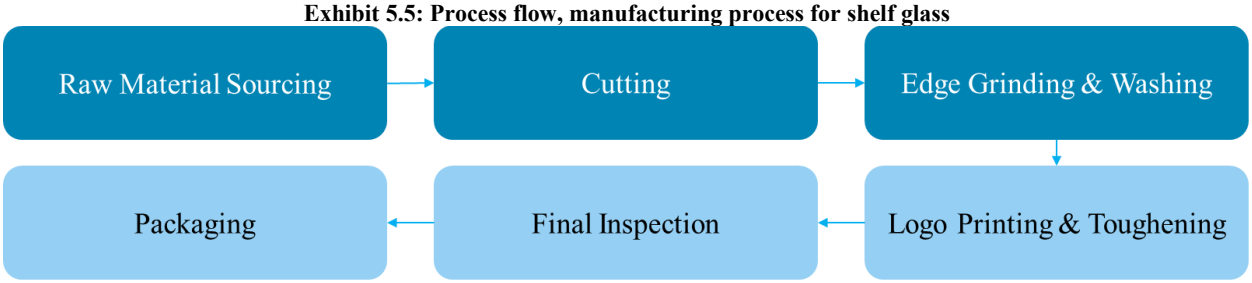
Toughened glass is a crucial component in the appliance sector, particularly for products that require transparent, aesthetic, durable, and heat-resistant materials. Appliance-grade toughened glass is typically tempered or heat-treated to ensure high durability and safety. Appliance-grade toughened glass often has features like scratch resistance, heat resistance, and sometimes advanced coatings for anti-smudge or anti-fog properties.

Printed Glass: Used in appliances where aesthetics are desired, such as refrigerator glass doors, microwave glass doors, printed washing machine lids, printed cooktop and hobs.

Shelf Glass: The process of manufacturing shelf glass involves several key steps. First, raw glass sheets are procured as the primary material. These sheets are then cut to the desired size and shape using specialized cutting machines. The cut edges are carefully ground and polished to ensure smooth and safe handling. In some cases, the glass may undergo a toughening process to enhance its durability. Once the glass pieces are prepared, they may be customized with logos or branding. After the final inspection to verify quality standards, the glass pieces are carefully packaged to prevent damage during transportation. Finally, the packaged glass is dispatched to warehouses or directly to customers, completing the

manufacturing process. Ajay Poly Ltd. is one of the top manufacturers of glass shelves for refrigerators in India with a market share of 31.3%, leveraging advanced manufacturing techniques to produce durable and aesthetically pleasing products that meet the needs of leading appliance brands.

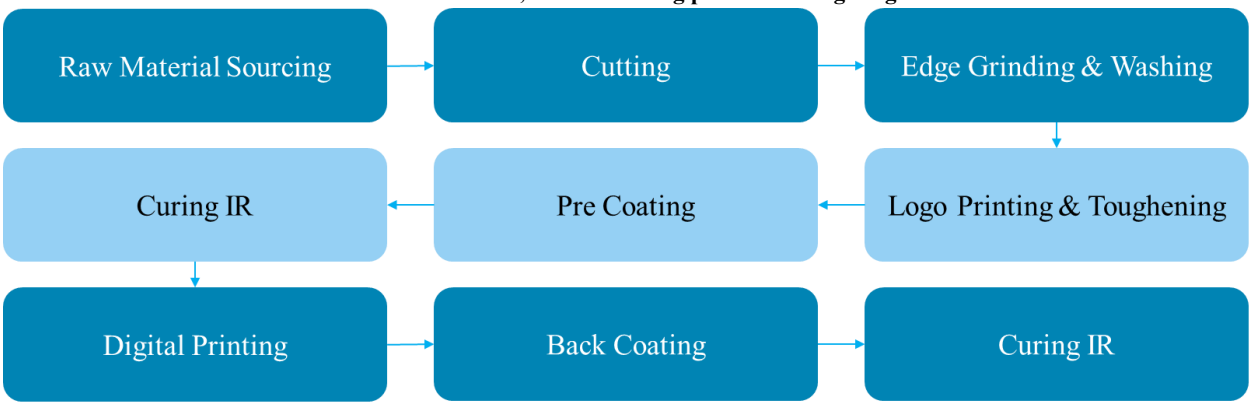
Exhibit 5.5: Process flow, manufacturing process for shelf glass



Source: Stakeholder interactions, Frost & Sullivan Analysis

Digital Glass Door: The manufacturing process for digital glass doors involves several stages. It begins with sourcing raw glass sheets, which are then cut and polished to the desired shape. The glass undergoes various treatments, including logo printing, toughening, pre-coating, digital printing, and back coating. After each treatment, the glass is cured under infrared radiation to solidify the applied layers. The final step involves quality inspection and packaging before the finished glass doors are shipped to customers. This process ensures the production of high-quality, durable, and visually appealing digital glass doors. For decoration, screen printing applies solid designs on glass, ideal for high-volume production, while digital printing uses inkjet technology for detailed, customizable designs, `catering to trends in aesthetic consumer appliances by brands like Samsung, LG, and Haier. Toughened glass is a crucial component in the appliance sector, particularly for products that require transparent, aesthetic, durable, and heat-resistant materials. Appliance-grade toughened glass is typically tempered or heat-treated to ensure high durability and safety. Appliance-grade toughened glass often has features like scratch resistance, heat resistance, and sometimes advanced coatings for anti-smudge or anti-fog properties.

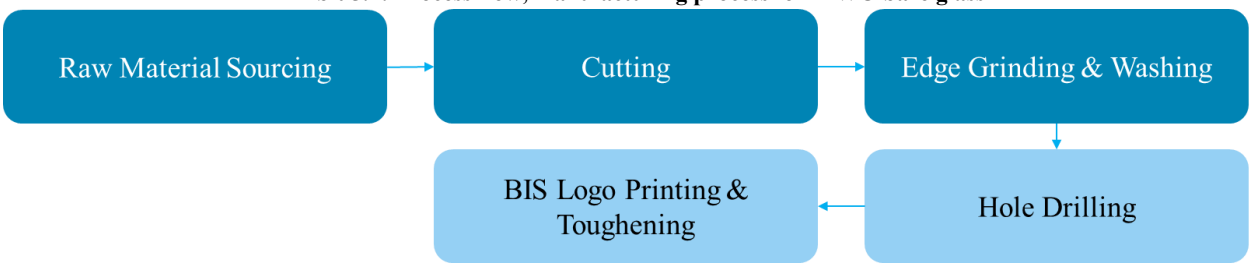
Exhibit 5.6: Process flow, manufacturing process for Digital glass door



Source: Stakeholder interactions, Frost & Sullivan Analysis

MWO bare glass: The manufacturing process for MWO bare glass involves sourcing raw glass sheets, cutting them to the desired size, and then grinding and polishing the edges. Holes are drilled as needed, and the glass is toughened for durability. After the BIS logo is printed, the glass undergoes final inspection and is then packaged and dispatched to customers.

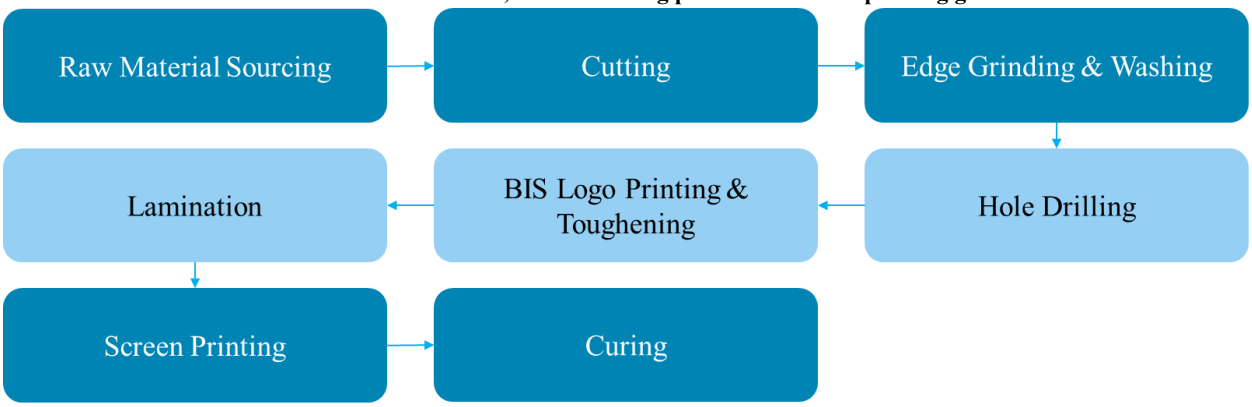
Exhibit 5.7: Process flow, manufacturing process for MWO bare glass



Source: Stakeholder interactions, Frost & Sullivan Analysis

MWO printing glass: The manufacturing process for MWO printing glass involves sourcing raw glass sheets, cutting them to size, and processing them through various stages. These stages include edge grinding, hole drilling, toughening, lamination, screen printing, and curing. After final inspection and packaging, the finished glass is ready for distribution. This process ensures the production of high-quality, durable, and aesthetically pleasing printed glass products.

Exhibit 5.8: Process flow, manufacturing process for MWO printing glass



Source: Stakeholder interactions, Frost & Sullivan Analysis

5.1.3. Magnet

Magnetic ferrites are known to possess crystalline structure, and the distribution of the bivalent metal ions and ferric metal ions in the available spaces among the oxygen atoms in the crystal lattice is what determines the magnetic properties of the ferrite. These ferrites could be either barium ferrite or strontium ferrite. The commonly practiced method for the production of ferrite magnets is to first mill particles of barium carbonate or strontium carbonate and ferric iron oxide together to a fine state of subdivision. Thereafter a homogeneous mixture of the milled particles in the stoichiometric amount required for barium or strontium ferrite is prepared, and finally the mixture is calcined at a temperature between 1,000ºC to 1,350ºC to transform the barium or strontium carbonate to barium or strontium oxide with concomitant in-situ formation of barium of strontium ferrite. The calcined product is then milled to a fine state of subdivision to obtain barium of strontium ferrite in powdered form.

This powder is then mixed with water to form a slurry and compacted in a die to produce solid magnets. The power can also be mixed with resin to form magnetic strips through extrusion process. The manufacturing process of magnetic strips has already been explained in the ‘Gasket’ section.

5.2 Applications and usage norm for the glass and extruded polymer components in appliances

This section captures applications of the glass and extruded polymer components, usage norm and approximate value of components used in a product. These norms have been used for sizing the market in the next section.

5.2.1. Polymer extruded products

A. Gaskets

Consumer Durable Type	Category - Applications	No. of gaskets used / product	Total price of gaskets per product (Rs.)
Household Refrigerator	Direct Cool - Door	1	80 - 90
	Frost Free - Door	2	145 - 205
	Side by Side - Door	2	300 - 350
Commercial Refrigerator	Visi Cooler - Door	1	120 - 150
	Deep Freezer - Door	1 - 2	80 - 100

B. Rigid profiles

Consumer Durable Type	Category - Applications	No. of rigid profiles / product	Total price of rigid profiles per product (Rs.)	Penetration
Household Refrigerator	Direct Cool - Shelf	4	35 - 45	Rigid profiles are used in approx. 93-94% products at present – expected to increase to 97-98% over next 4-5 years
	Frost Free - Shelf	6	90 - 110	Used in all models
	Side by Side - Shelf	16 - 20	250 - 300	Used in all models
Commercial Refrigerator	Visi Cooler - Door	4	270 - 300	Used in all models
	Visi Cooler - Internal	4 transparent profiles + other rigid profiles	250 - 280	Used in all models
	Deep Freezer - Top Cover	4	300 - 330	Used in all models

C. Extruded Sheets

Consumer Durable Type	Category	Weight of sheets used / product	Total price of sheets per product (Rs.)
Household Refrigerator	Direct Cool	2	340 - 375
	Frost Free	5	875 - 925
	Side by Side	7	1,250 - 1,300

5.2.2. Toughened Glass

Consumer Durable Type	Category - Applications	No. of toughened glass / product	Total price of toughened glass per product (Rs.)	Penetration

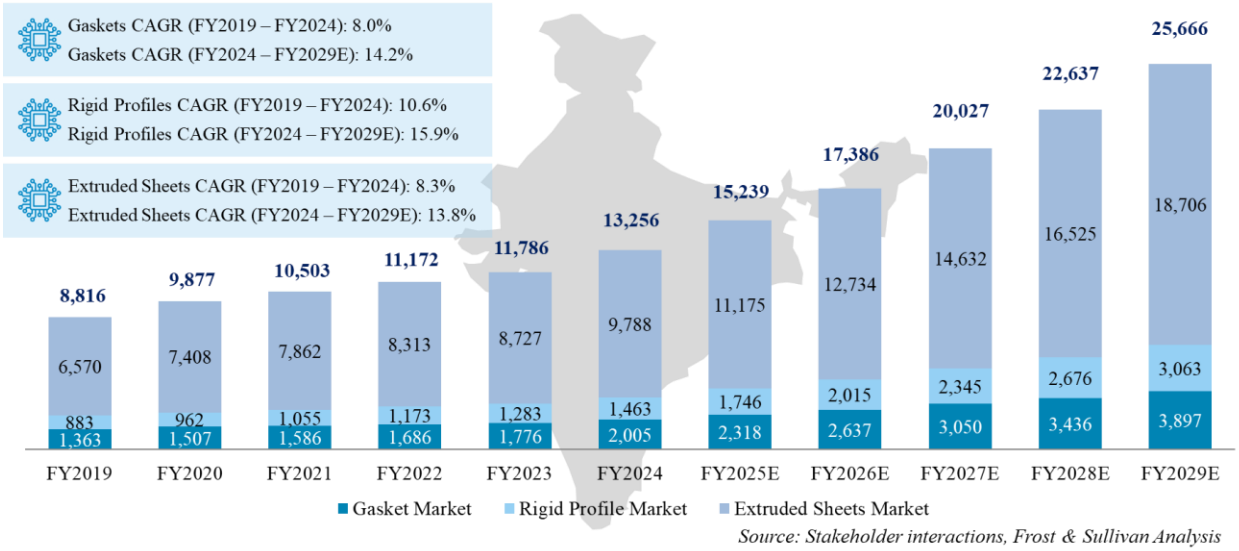
Household Refrigerator	Direct Cool - Shelf	3	165 - 265	Current penetration[10] approx. 94%. 97-98% penetration in next 4-5 years
	Frost Free - Shelf	3 - 4	280 - 400	Used in all models
	Side by Side - Shelf	8 - 10	500 - 550	Used in all models
	Door (without SBS model)	1	1,200 – 1,400	Current penetration approx. 2-3%. 15-20% penetration in next 4-5 years
Commercial Refrigerator	Visi Cooler	1	1,400 – 1,600	Used in all models
	Deep Freezer	1	700 - 800	Used in approx. 40% deep freeze – expected to increase by 5% each year
Washing Machine	Top Load - Fully Automatic	1	160 - 170	Flat Glass / Curved Glass – Used in all models
	Top Load - Semi Automatic	2	210 - 230	Used in all models
	Front Load - Fully Automatic	1	375 - 400	Used in all models
Microwave	Front Door + Back Panel	1	180 - 200	Used in all models
Cooktop	Top Glass	1	590 - 650	Used in all models

5.3 Market size for Polymer Extruded and Toughened Glass products

The following section estimates the market size for various polymer extruded and toughened glass products:

5.3.1. Polymer extruded products

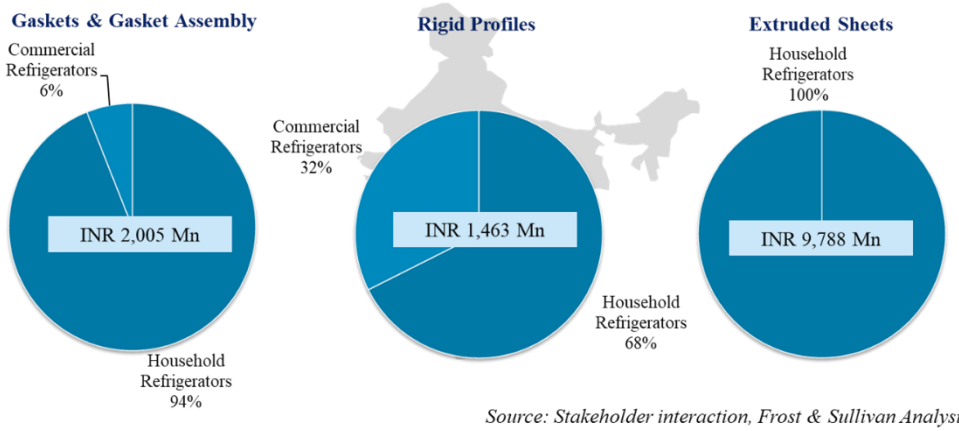
Exhibit 5.9.a: Market size for Polymer Extruded Products in Appliances, INR million, India, FY2019 – FY2029E



Source: Stakeholder interactions, Frost & Sullivan Analysis

[10] *Penetration: In this context, penetration refers to the percentage of household refrigerator and commercial refrigeration units that incorporate toughened glass as a standard component*

Exhibit 5.9.b: Segmentation of Polymer Extruded Products in Refrigerators (Household and Commercial) by Percentage, FY2024

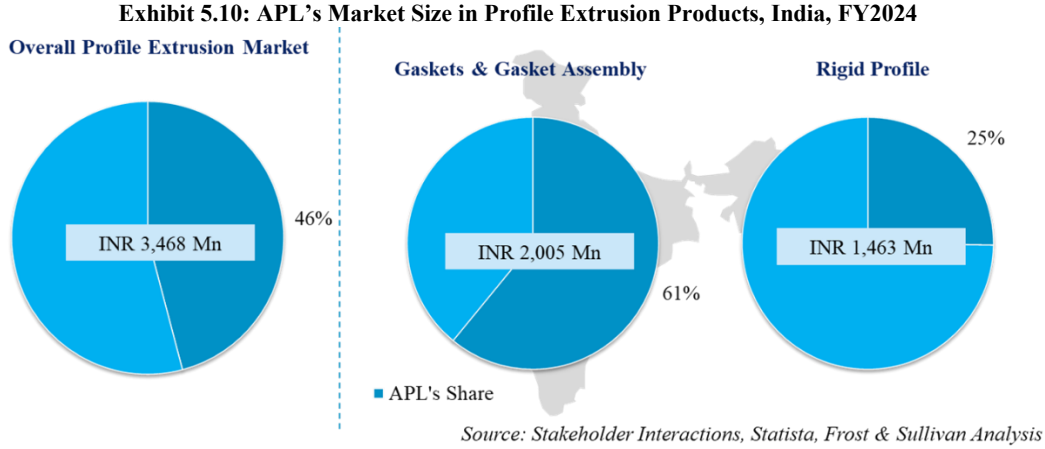


Source: Stakeholder interaction, Frost & Sullivan Analysis

The below chart estimates APL's current market share in total profile extrusion (including gasket & gasket assembly and rigid profile) market and at each product level. The rest of the market is catered to either by other domestic companies or through imports (as components or as part of finished products).

The market for profile extrusion products with APL's market share estimated around 45.9% are majorly used in household refrigerators, Visi coolers, and deep freezers. This segment is dominated by gaskets, with APL accounting for 61% of the total gasket market in appliances. Rigid profiles constitute a significant portion as well, with APL holding around 25.2% share of the total market.

Exhibit 5.10: APL's Market Size in Profile Extrusion Products, India, FY2024



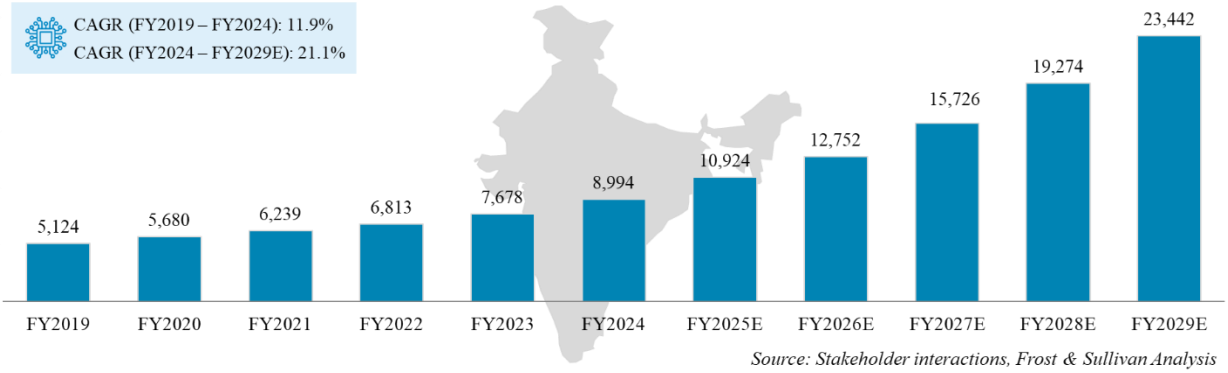
Source: Stakeholder Interactions, Statista, Frost & Sullivan Analysis

5.3.2. Toughened Glass in appliances

The Indian toughened glass industry has witnessed significant growth in recent years, driven by increasing demand from various sectors including consumer durables. The glass door market in India is projected to witness significant growth between FY2024 and FY2029, with the market value expected to expand at an impressive CAGR of 73.9%, increasing from INR 531 million in FY2024 to approximately INR 8,449 million by FY2029.

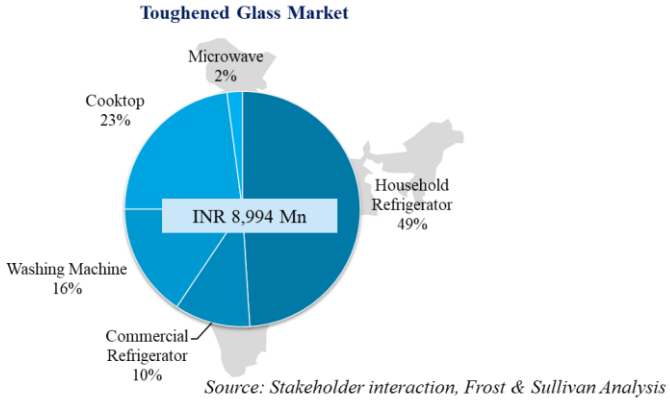
This rapid growth is primarily driven by the shift in sourcing strategies of key players in the market. Currently, 100% of the glass used in the production of glass doors is imported. However, major players have announced plans to transition to domestic sourcing, which is expected to boost the market considerably from FY2025 onward.

Exhibit 5.11.a: Market size for Toughened Glass Products in Appliances, INR million, India, FY2019 – FY2029E



Source: Stakeholder interactions, Frost & Sullivan Analysis

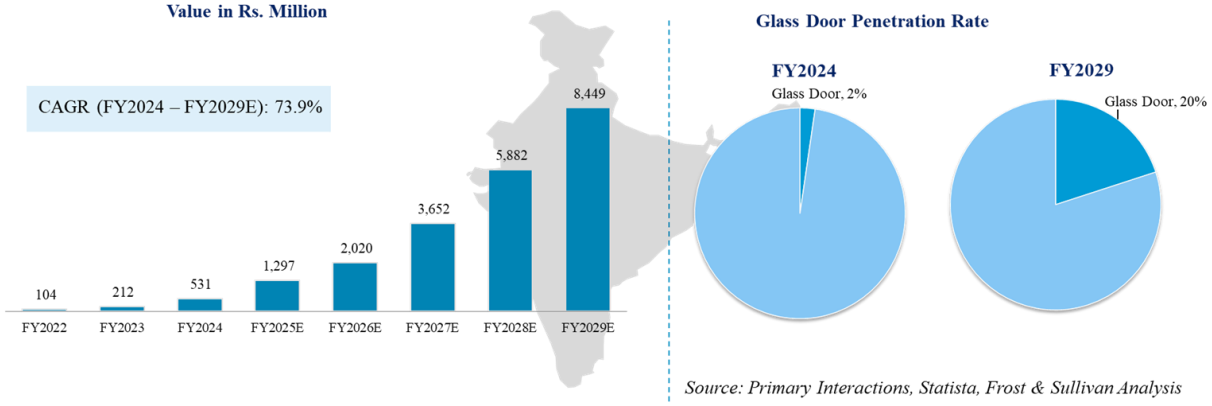
Exhibit 5.11.b: Segmentation of Toughened Glass in Appliances by Percentage, FY2024



Source: Stakeholder interaction, Frost & Sullivan Analysis

Furthermore, the penetration rate of glass doors in the Indian market is anticipated to rise sharply, increasing from just 2% in FY2024 to an estimated 20% by FY2029. This growth reflects a combination of rising demand for energy-efficient and aesthetically appealing designs and the push toward self-reliance in raw material procurement within the country.

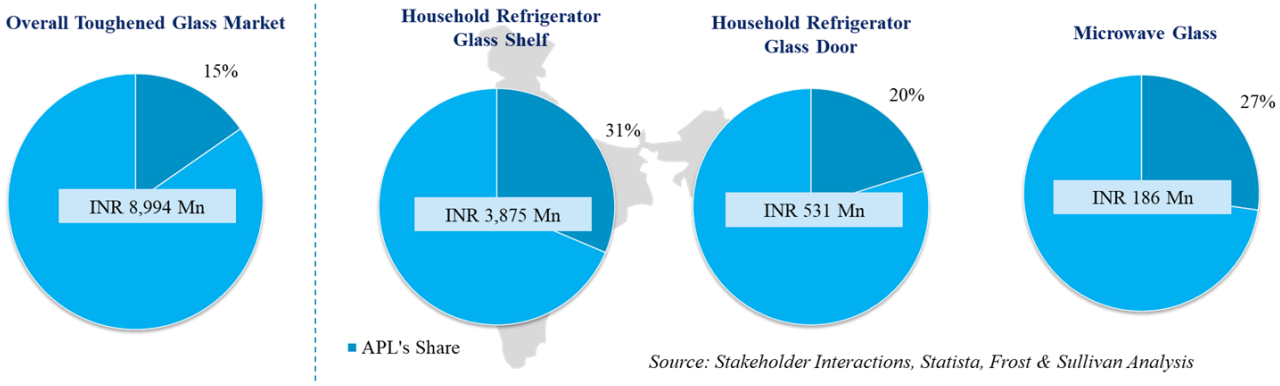
Exhibit 5.12.a: Market size for Toughened Glass in Household Refrigerator Door, INR million, India, FY2019 – FY2029E



Source: Primary Interactions, Statista, Frost & Sullivan Analysis

The adoption of toughened glass in home appliances is projected to witness a significant growth, with an estimated APL's market share of 15%. This growth is primarily driven by the increasing demand for durable, safe, and energy-efficient appliances. Furthermore, the appliance wise segmentation in this market includes household refrigerator glass shelves that contribute INR 3,875 million, with APL's share at 31.3%. Household refrigerator glass doors account for INR 531 million, and APL's share is 20.1%. Finally, microwave glass contributes INR 186 million, with APPL's share being 27.3%.

Exhibit 5.12.b: APL's Market Share in Toughened Glass Market in Appliances, India, FY2024



Source: Stakeholder Interactions, Statista, Frost & Sullivan Analysis

Products of Interest:

- **Household Refrigerator Shelves and Doors:** Toughened glass offers superior strength and resistance to thermal shocks, making it ideal for household refrigerator shelves and doors.
- **Visi Coolers:** The transparent nature of toughened glass enhances visibility and aesthetics in visi coolers.
- **Deep Freezers:** Toughened glass provides durability and resistance to low temperatures, making it suitable for deep freezer applications.
- **Washing Machines:** Toughened glass is used in washing machine panels and control panels, offering a sleek and modern look.
- **Microwave Ovens:** Toughened glass is used in microwave oven doors for its heat resistance and safety features.
- **Cooktops:** Toughened glass cooktops provide a smooth, easy-to-clean surface and can withstand high temperatures.

The growth in toughened glass products in appliances has been further fueled by government initiatives, technological advancements, and changing consumer preferences.

Growth Drivers:

- **Anti-Dumping Duty on Imported Toughened Glass**: The imposition of anti-dumping duty on imported toughened glass has provided a significant boost to domestic manufacturers by levelling the playing field. The Indian government has imposed an anti-dumping duty on toughened glass used in home appliances, specifically those with a thickness between 1.8 mm to 8 mm and an area of 0.4 square meters or less, **imported from China**. This duty aims to protect domestic manufacturers from unfair trade practices where products are sold below market price (dumping).

  Key Points:

  - **Affected Products:** Toughened glass for home appliances (thickness: 1.8 mm - 8 mm, area: <= 0.4 sq m)
  - **Origin Country:** China (People's Republic of China)
  - **Duty Period:** Five years from the date of notification (November 17, 2023)
  - **Duty Rate:** Varies depending on the specific producer. The anti-dumping policy lists duty rates for several Chinese producers, ranging from NIL (no duty) to USD 243 per metric ton (MT).

- **Currency:** Indian Rupee (INR). The exchange rate for calculating the duty will be based on the relevant notifications issued by the Ministry of Finance.

Additional Information:

- This duty is not applicable to all toughened glass. Exclusions include glass lids of utensils, switch panels, curved colored glass for washing machines, double-glazed units, dome-shaped glass, and grooved glass.
- The duty is intended to level the playing field for domestic manufacturers and encourage domestic production.

- **Increasing Demand from Diverse Sectors**: The growing demand from sectors like automotive, construction, and consumer durables has propelled the industry's growth.
- **Government Initiatives:** Government initiatives aimed at promoting domestic manufacturing and infrastructure development have created favorable conditions for the industry.
- **Rising Urbanization and Infrastructure Projects**: Rapid urbanization and infrastructure development have fueled the demand for toughened glass.
- **Mandatory BIS Certification:** The mandatory requirement of BIS certification for processed glass has ensured quality standards and consumer safety, providing a level playing field for domestic manufacturers.

Entry barriers:

- **Stringent Customer Specifications and Approvals:** Meeting stringent quality standards and securing customer approvals, especially from OEMs, can be a significant challenge.
- **Customer Stickiness:** Established players often have long-standing relationships with customers, making it difficult for new entrants to penetrate the market.
- **High Capital Investment:** The industry requires significant capital investment in plant and machinery, particularly for large-scale operations.
- **Technological Expertise**: Advanced technological know-how is essential for producing high-quality toughened glass, which can be a barrier for new entrants.
- **Level of Vertical Integration:** Companies with a higher degree of vertical integration, controlling raw material sourcing to final product distribution, have a competitive advantage.

Key challenges:

- **Fluctuating Raw Material Prices:** The industry is vulnerable to fluctuations in raw material prices, such as silica sand and soda ash, which can impact profitability.
- **Energy Costs:** High energy costs can significantly impact production costs, especially for energy-intensive processes like glass melting.
- **Technological Advancements:** Keeping up with the latest technological advancements is crucial to remain competitive. Continuous investment in R&D is necessary to stay ahead of the curve.
- **Environmental Regulations:** Adherence to stringent environmental regulations can increase compliance costs.

By effectively addressing these challenges and capitalizing on the growth opportunities, the Indian toughened glass industry can continue to thrive and contribute to the nation's economic growth.

5.3.3. Other business verticals: Market overview

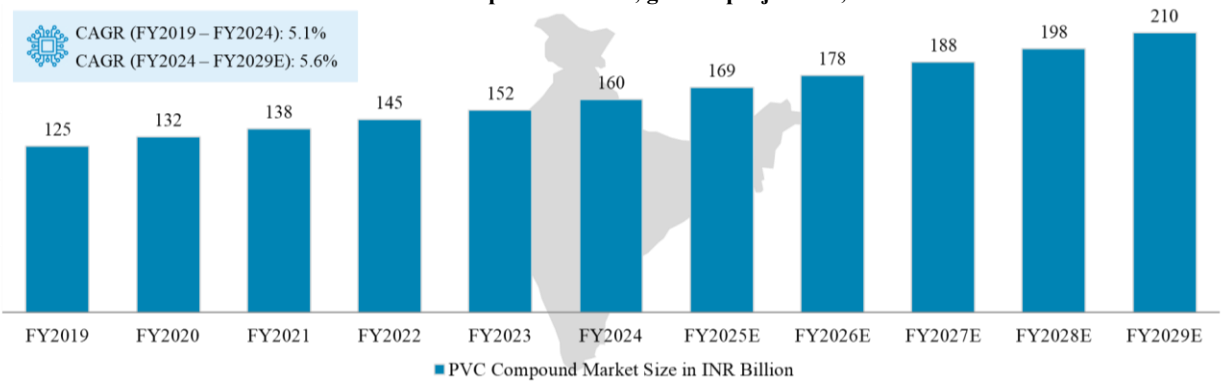
Epoxidised Soyabean Oil (ESO) and PVC compounds are essential materials in the home appliances sector, where durability, performance, and sustainability are critical. ESO, derived from natural soybean oil, serves as a plasticizer and stabilizer in PVC production, offering enhanced flexibility and resistance to thermal and UV degradation. These qualities make it ideal for components like refrigerator gaskets and other flexible parts used in appliances.

PVC compounds, known for their versatility and cost efficiency, are integral to home appliance manufacturing. They are used in producing rigid and flexible components, such as door profiles, shelves, and inner linings, ensuring strength, longevity, and aesthetic appeal. The rising demand for energy-efficient and durable home appliances underscores the importance of these materials in achieving high-quality, reliable designs.

PVC Compound

PVC compounds are a crucial component in the manufacturing of various household appliances. They are used in applications ranging from electrical insulation to durable casings. As India's household appliance market continues to expand, driven by rising disposable incomes and urbanization, the demand for PVC compounds is expected to grow significantly. The chart indicates a Compound Annual Growth Rate (CAGR) of 5.1% from FY2019 to FY2024 and 5.6% from FY2024 to FY2029E, reflecting the positive outlook for this industry. This growth trajectory presents a promising opportunity for businesses involved in the production and supply of PVC compounds to the household appliance sector. Furthermore, Ajay Poly offers a diverse range of PVC compounds that meet global standards, ensuring excellent aesthetics, color fastness, and application-specific properties. They are one of the leading manufacturers of PVC compounds in India.

Exhibit 5.13: India's PVC Compound market, growth projections, FY2019 – FY2029E



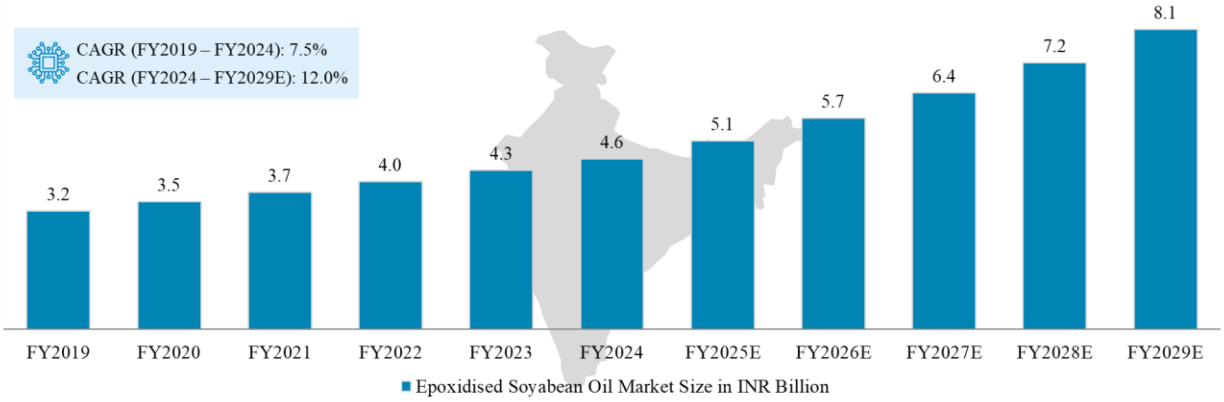
Source: Stakeholder interactions, Frost & Sullivan Analysis

Epoxidised Soyabean Oil

The Epoxidised Soyabean Oil (ESBO) market in India is seeing steady growth, driven by its use in home appliances and the growing demand for sustainable materials in consumer goods manufacturing. ESBO, a non-toxic, eco-friendly alternative to traditional plasticizers, plays a critical role in the PVC (polyvinyl chloride) industry, commonly used in consumer appliances such as refrigerators, microwaves, washing machines, and cooktops. From FY2019 to FY2024, the ESBO market has experienced moderate growth, increasing from INR 3.2 billion in FY2019 to an estimated INR 4.6 billion by FY2024. The annual growth rate for this period is 7-8%. This growth is largely driven by the increasing demand for eco-friendly

plasticizers in home appliances, such as refrigerator doors, microwave glass, and cooking surfaces. The shift from traditional plasticizers to bio-based alternatives like ESBO is spurred by environmental regulations and consumer preference for sustainable, green products.

Exhibit 5.14: India's Epoxidised Soyabean Oil market, growth projections, FY2019 – FY2029E



Source: Stakeholder interactions, Frost & Sullivan Analysis

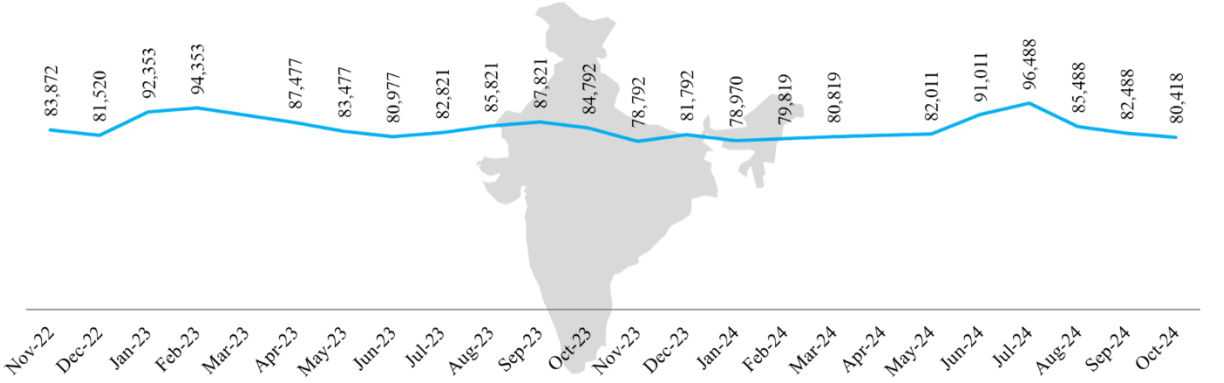
5.3.4. Raw material price trend

The pricing trends of key raw materials such as Barium Carbonate, Soybean Oil, PVC Resin, Float Glass, and Iron Oxide play a critical role in determining the cost structure and profitability across various industries. These materials are essential inputs for a wide range of applications, including manufacturing, construction, and home appliances. Monitoring their price movements provides valuable insights into market dynamics, supply-demand imbalances, and external factors such as geopolitical events, trade policies, and seasonal variations. The following charts illustrate the historical price trends for these raw materials, highlighting fluctuations and underlying patterns over the selected period.

PVC Resin

The chart illustrates the pricing trends for PVC resin over a specific time period in India. Prices fluctuate from INR 78,970 to INR 96,488 indicating significant changes in the cost of PVC resin during this period. The price increase and decrease over time may reflect various market factors, such as changes in raw material costs, supply chain disruptions, or shifting demand in the market.

Exhibit 5.15: PVC resin price trend, INR per MT, Nov 2022 to Oct 2024



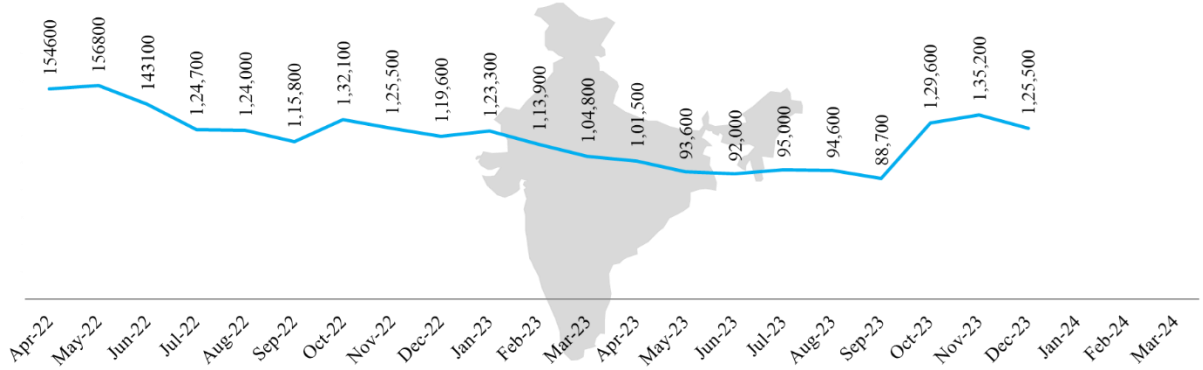
Source: Stakeholder interactions, Frost & Sullivan Analysis

Soya bean oil

The chart presents the pricing trends for soybean oil across India over time, with values such as INR 93,600, INR 101,500, INR 104,800, and INR 113,900 recorded at different points. These fluctuating prices are influenced by various factors, including seasonal supply variations, market demand shifts, production costs,

and transportation factors. The price progression over time suggests increasing costs, which could be attributed to supply chain disruptions, changes in production rates, or external economic influences like inflation and global soybean prices.

Exhibit 5.16: Soyabean Oil price trend, INR per MT, Apr 2022 to Dec 2023



Source: Stakeholder interactions, Frost & Sullivan Analysis

6. OPERATIONAL AND FINANCIAL BENCHMARKING

6.1 Operational Benchmarking

6.1.1. Ajay Poly Ltd.

PARAMETERS	DETAILS
Company Overview	• Ajay Poly Limited (APL), part of the DCJ Group, was founded in 1991. The company specialises in backward integration in gaskets & rigid extrusion and manufacturing polymer extruded and glass products, serving key industries including home appliances. Ajay Poly Ltd.'s close collaboration with both multinational and Indian OEMs in design and development provides a significant competitive advantage. This joint development not only fosters innovation but also establishes a formidable barrier to entry for new competitors, making it difficult for them to replicate the depth of expertise and strategic alliances that Ajay Poly has cultivated over the years
Key Products	• Extruded Polymer Products: Refrigerator door gaskets, thermoplastic extrusions, co-extruded sheets. • Toughened Glass Products: Refrigerator glass doors and shelves, microwave oven glass, washing machine glass, cooktop glass. • Magnetic Products: Magnetic strip, magnetic sheet/printed magnetic sheet • Raw Materials/others: Barium/Strontium ferrite powder, PVC compound, Epoxidised Soyabean Oil.
Industries Served	• Home appliances, refrigeration, and consumer electronics.
Plant locations	• Greater Noida Manufacturing Unit 1, 2, 3, 4 & 5 • Mohali Manufacturing Unit • Karegaon - Pune Manufacturing Unit • Shirwal – Pune Manufacturing Unit • Sanand – Gujarat Manufacturing Facility • Chennai Manufacturing Facility

6.1.2.Paramount Polymers Pvt Ltd

PARAMETERS	DETAILS
Company Overview	• Paramount Group, established in 1992, specializes in providing extrusion, moulding, and chrome plating services to various industries
Key Products	• Extrusion: Plastic and rubber products in various shapes and sizes. • Moulding: Engineering plastic parts using presses from 40 to 3,000 tons. • Chrome Plating: Surface treatment with a capacity of 1.22 million sq. inches per month. • Assembly & Postproduction: Includes printing, packaging, and product assembly.
Industries Served	• Automotive, electrical, consumer goods, and industrial sectors
Plant locations	• Faridabad to manufacture plastic & rubber parts for OEMs in the appliance industry • Contract Manufacturing Plants Established 3 plants to manufacture FMCG products for Marico, HUL & Reckitt Benckiser. • Plastic Injection Moulding Plants in Pune • Rubber Compounding & Moulding Plant in Pune • Manufacture rubber components for home appliances in Chennai and provide local support to customers in the southern region.

6.1.3.Holm industries

PARAMETERS	DETAILS
Company Overview	• HOLM KK Extrusions Pvt. Ltd. manufactures extruded profiles and sealing systems and was established in 1996. The company has manufacturing facilities in Pune and Greater Noida, serving the appliance, automotive, and construction sectors
Key Products	• Electrical Rubber Panel Gaskets: Used in electrical panels for sealing and insulation. • Rigid PVC Profiles: These profiles are utilized in various applications, including construction and automotive. • Rubber Grommets: Essential for protecting wires and cables from abrasion. • Co-extruded and Multi Co-extruded Profiles: Customizable options for specific applications
Industries Served	• Appliance Sector: They produce gaskets and sealing systems for household and commercial appliances. Also, rubber grommets are widely used in electronics, machinery, electrical appliances, sports equipments, furniture and lighting. • Automotive Industry: The company provides extruded profiles and sealing solutions for automotive applications. • Construction Sector: Custom profiles are developed for various construction needs, focusing on sealing applications.
Plant Locations	The main manufacturing facilities are located in: • Ranjangaon, Pune, Maharashtra - This is the primary manufacturing plant where a wide range of products are produced. • Greater Noida, NCR - This location complements their production capabilities

6.1.4.Shree Ashtavinayak Glass

PARAMETERS	DETAILS
Company Overview	• Manufacturer of glass and glazing solutions for various applications.
Key Products	• coated glass, mirrors, laminated glass, insulated glass units, • Kitchen shutters, • LED mirrors • Writing boards, clips and sealants.
Industries Served	• Building and construction, automotive, solar energy, interior design.
Plant Locations	• Khandala, Satara, Maharashtra- manufacturing facility

6.1.5.Xpro

PARAMETERS	DETAILS
Company Overview	• Xpro India Limited, established in 1998 and part of the Birla Group, specializes in polymer processing with multiple divisions and manufacturing units across India.
Key Products	• Capacitor/Dielectric Films: Specially designed polypropylene films for high-performance applications in the capacitor industry. • Coex Cast Films: Formulated cast coextruded films produced on sophisticated multi-layer film lines. • Coex Sheets: Monolayer and coextruded plastic sheets based on various thermoplastic resins. • Thermoformed Liners: Primarily used for refrigerator inner and door liners, as well as automotive and sanitary applications.
Industries Served	• Consumer electronics, home appliances, automotive, sanitary applications
Plant Locations	• Manufacturing units across India, including locations in West Bengal, Madhya Pradesh, and Maharashtra

6.1.6.Dixon Technologies

PARAMETERS	DETAILS
Company Overview	• Dixon Technologies is an electronics manufacturing services company based in Noida, specializing in contract manufacturing for consumer electronics, home appliances, lighting, and security devices.
Key Products	• Washing machine LED TV, air conditioners, refrigerators • Lighting solutions • Mobile phones • Security surveillance system • Reverse logistics • Medical electronics
Industries Served	• Consumer electronics, home appliances, security devices
Plant Locations	• 17 manufacturing units across India, including Noida, Dehradun, and Tirupati.

6.1.7.Amber Enterprises

PARAMETERS	DETAILS
Company Overview	• Amber Enterprises is a solution provider for the HVAC industry, specializing in the design, development, and manufacturing of room air conditioners and their components, serving a wide range of industries including consumer durables, automotive, and defense
Key Products	• Room air conditioners • Heat exchangers • Multi-flow condensers • Sheet metal components: The components are widely used in the manufacture of tractors and automobiles
Industries Served	• Consumer durables, automotive, railways and defence
Plant Locations	• 27 manufacturing units across 9 locations in India, including Noida, Dehradun, Sri city, Chennai, Pune, Kadi and more.

6.1.8.PG Electroplast

PARAMETERS	DETAILS
Company Overview	• PG Electroplast is an electronics manufacturing services provider in India, offering solutions including original design manufacturing (ODM), original equipment manufacturing (OEM), and plastic injection molding for various consumer durables and electronics.
Key Products	• Air conditioners • Washing machines • LED televisions • Air coolers • Plastic components
Industries Served	• Consumer durables, consumer electronics, automotive, and bathroom fittings
Plant Locations	• Manufacturing units in Greater Noida, Roorkee, and Ahmednagar

6.1.9.Epack Durables

CATEGORY	DETAILS
Company Overview	• Epack Durables is a manufacturer of room air conditioners and small domestic appliances in India. The company specializes in design and manufacture complete RACs, induction cooktops, mixer-grinders and water dispensers.
Key Products	• Room air conditioners • Small domestic appliances • Heat exchangers, fans and copper tubing
Industries Served	• Consumer durables, small domestic appliances
Plant Locations	• Manufacturing facilities in Dehradun, Bhiwandi, Greater Noida and Sri city

6.1.10. Delta Magnet

CATEGORY	DETAILS

Company Overview	• Delta Manufacturing Ltd. is a producer of hard ferrite magnets, including ring and arc magnets. The company specializes in manufacturing and supplying magnets, particularly for applications in two-wheelers like magnetos and starter motors.
Key Products	• Sector Magnets: Majorly used in automotive magneto's & alternators • Motor Magnets: Used in starter motors of automotive and motor cycle • Ferro fluid: Major applications of ferro fluid are loudspeaker, liquid seals, reducing friction, aerospace, analytical instrumentation, biomedical, heat transfer-cooling and display & education kits • Ring Magnets: Used in loudspeakers, lifting device etc • Isotropic Magnets: Majorly used in motors, sensors, handheld devices etc. • Low Energy Embedding Powder (LEEP): LEEP magnets include door closure seals, health magnets, injection-molded parts, crafts, coated magnets, and advertising specialties • Rare Earth Magnet: Used in applications such as electric vehicle drive motors, solar pumps, drone motors
Industries Served	• Automobiles • Electronics • Medical Appliances • Information & Communications
Plant Locations	• Manufacturing facilities in Nashik, Maharashtra

6.1.11. Rehau

CATEGORY	DETAILS
Company Overview	• REHAU, established in Germany in 1948, is a global provider of polymer-based solutions. It entered the Indian market in 1997 and serves multiple industries, including construction, automotive, and furniture. The company emphasises advanced technology and sustainability in its product offerings.
Key Products	• uPVC Edgebands • Laminates and solid surfaces • Furniture components (e.g., roller shutter and plinth systems) • Plumbing and drainage systems • Radiant heating and cooling solutions • Industrial solutions like gaskets and profiles
Industries Served	• Furniture • Construction (residential and commercial) • Automotive • Industrial refrigeration and insulation
Plant Locations	• Pune, Maharashtra (two facilities producing edge bands, gaskets, and profiles) • Vadodara, Gujarat (exclusive edge band manufacturing)

6.1.12. Bright Brothers

CATEGORY	DETAILS
Company Overview	• Bright Brothers Limited, established in 1947, is a leading manufacturer of plastic products and injection-molded components in India. The company caters to a wide range of industries and focuses on consumer durable components and automotive parts. It has diversified into material handling products, including crates, bins, and

	pellets, along with personal care items such as hair care products and toothbrush handles.
Key Products	• Consumer Durable Parts & Systems: Includes refrigerator parts and other plastic components. • Automotive Parts & Systems: Plastic parts for automotive OEMs. • Material Handling Products: Crates, bins, and pellets. • Personal Care Products: Hair care products and toothbrush handles. • Services: Tool and die making, along with painting services
Industries Served	• Consumer durables • Automotive • Personal care • Material handling
Plant Locations	• Faridabad • Pondicherry (Plant 1 and Plant 2) • Bhimtal • Various locations in Pune

6.2 Financial Benchmarking

Exhibit 6.1: Revenue from the operation of key competitors, value (in INR Million), Gross Margin (in %), EBITDA (in INR Million), EBITDA Margin (in %), FY2022 – FY2024

Competitors	Revenue from Operations (INR Mn)			Gross Margin (%)			EBITDA (INR Mn)			EBITDA Margin (%)		
	FY2022	FY2023	FY2024	FY2022	FY2023	FY2024	FY2022	FY2023	FY2024	FY2022	FY2023	FY2024
Ajay Poly	1,418.1	2,406.1	3,651.1	38.0%	35.6%	38.1%	101.4	196.8	453.0	7.1%	8.2%	12.4%
Delta Magnet	879.7	796.3	835.7	60.2%	65.1%	63.4%	-34.8	-58.0	-23.0	-4.0%	-7.3%	-2.7%
Paramount Polymers	1,799.1	2,138.7	NA	34.1%	32.0%	NA	153.0	165.7	NA	8.5%	7.7%	NA
Holm-KK Extrusion	203.0	218.3	242.8	43.1%	43.0%	47.5%	19.5	21.3	18.8	9.6%	9.8%	7.7%
Shree Ashtavinayak Glass	469.4	630.1	766.3	29.4%	27.4%	29.8%	47.0	65.0	80.0	10.0%	10.3%	10.4%
Xpro	4,717.2	5,109.7	4,654.1	31.2%	32.0%	33.9%	638.2	744.3	661.4	13.5%	14.6%	14.2%
Bright Brothers	2,302.5	2,067.4	2,446.7	29.7%	29.4%	32.6%	130.7	8.8	92.6	5.7%	0.4%	3.8%
Rehau	3,092.1	3,852.9	3871.0	43.4%	42.8%	50.1%	253.5	248.9	282.8	8.2%	6.5%	7.3%
Dixon Technologies	1,06,970.8	1,21,920.1	1,76,909.0	8.6%	9.6%	9.5%	3,790.5	5,143.7	7,078.7	3.5%	4.2%	4.0%
Amber	42,064.0	69,271.0	67,292.7	16.7%	15.9%	18.9%	2,753.8	4,179.3	4,918.8	6.5%	6.0%	7.3%
PG Electroplast	11,116.4	21,599.5	27,465.0	20.8%	18.5%	20.0%	890.3	1,761.6	2,617.9	8.0%	8.2%	9.5%
Epack Durables	9,241.6	15,388.3	14,195.6	14.3%	14.0%	16.7%	688.0	1,025.2	1,161.5	7.4%	6.7%	8.2%

Source: Annual Reports of Companies published in RoC, MCA; Frost & Sullivan Analysis

Gross Margin= (Total revenue-cost of goods sold)/Total revenue*100; EBITDA = PBT + (Finance Cost + Depreciation + Amortization) – Other Income; EBITDA Margin: EBITDA / (Revenue from Operations)

Exhibit 6.2: PAT (in INR) Million, PAT Margin (in %), RoE (in %), RoCE (in %), FY2022 – FY2024

Competitors	PAT (INR Mn)			PAT Margin (%)			RoCE (%)			RoE (%)		
	FY2022	FY2023	FY2024	FY2022	FY2023	FY2024	FY2022	FY2023	FY2024	FY2022	FY2023	FY2024
Ajay Poly	35.2	114.3	211.0	2.5%	4.7%	5.8%	7.4%	12.6%	21.3%	6.4%	17.8%	25.7%
Delta Magnet	192.7	-167.4	-103.9	21.7%	-20.6%	-12.3%	-7.6%	-11.9%	-9.4%	41.9%	-36.1%	-32.3%
Paramount Polymers	-1.2	11.1	NA	-0.1%	0.5%	NA	3.3%	4.5%	NA	-0.4%	3.5%	NA
Holm-KK Extrusion	8.4	8.7	6.2	4.1%	4.0%	2.6%	6.3%	7.1%	5.1%	5.7%	5.7%	3.9%
Shree Ashtavinayak Glass	-4.8	4.1	19.1	-1.0%	0.6%	2.5%	5.4%	9.2%	10.8%	-8.1%	5.8%	21.3%
Xpro	449.3	453.6	438.8	9.5%	8.8%	9.2%	21.5%	23.8%	12.7%	34.3%	22.4%	11.1%
Bright Brothers	319.6	-37.8	-47.7	13.8%	-1.8%	-1.9%	13.8%	-1.8%	-1.9%	49.6%	-5.0%	-6.8%
Rehau	39.0	-4.6	-66.7	1.2%	-0.1%	-1.7%	5.7%	5.4%	5.5%	4.9%	-0.6%	-8.6%
Dixon Technologies	1,903.3	2,550.8	3,749.2	1.8%	2.1%	2.1%	25.1%	27.4%	32.6%	21.9%	22.4%	24.9%
Amber	1,113.2	1,637.8	1,394.7	2.6%	2.3%	2.1%	6.9%	9.1%	8.9%	6.5%	8.8%	6.9%
PG Electroplast	374.2	774.7	1,370.1	3.4%	3.6%	5.0%	12.5%	17.3%	18.4%	14.8%	21.9%	19.1%
Epack Durables	174.3	319.7	353.7	1.9%	2.1%	2.5%	12.9%	11.7%	7.9%	18.3%	14.7%	5.9%

Source: Annual Reports of Companies published in RoC, MCA; Frost & Sullivan Analysis

PAT Margin = PAT / Total Income; ROCE = [EBIT / (Average Capital Employed)] where Average Capital Employed = Net Worth + Total Borrowing (Long Term + Short Term); EBIT = (PBT + Finance Cost- Other Income); ROE = PAT / (average Net Worth)

Exhibit 6.3: Asset Turnover Ratio, Cash conversion cycle (in days). Net debt/Equity, Net debt/EBITDA FY2022 – FY2024

Competitors	Fixed Asset Turnover Ratio			Cash Conversion Cycle (in days)			Net Debt/Equity			Net Debt/ EBITDA		
	FY2022	FY2023	FY2024	FY2022	FY2023	FY2024	FY2022	FY2023	FY2024	FY2022	FY2023	FY2024
Ajay Poly	1.54	2.03	2.32	86	70	66	0.72	1.15	1.29	4.06	4.18	2.63
Delta Magnet	0.62	0.57	0.58	143	128	103	0.52	1.03	1.43	-8.21	-6.68	-16.71
Paramount Polymers	1.47	2.10	NA	41	36	NA	2.83	2.88	NA	5.75	5.59	NA
Holm-KK Extrusion	1.45	1.10	1.17	110	112	104	-0.04	-0.12	-0.14	-0.28	-0.90	-1.19
Shree Ashtavinayak Glass	1.01	1.26	1.42	100	93	91	5.48	5.45	3.96	7.73	6.27	5.18
Xpro	1.55	1.72	1.56	34	36	39	0.37	0.03	-0.51	1.08	0.08	-4.30
Bright Brothers	1.88	1.59	1.69	96	82	63	0.09	0.17	0.16	0.57	14.31	1.15
Rehau	1.75	2.04	2.01	98	92	98	1.21	1.28	1.31	3.91	4.19	3.45
Dixon Technologies	13.80	10.72	10.44	5	6	2	0.28	-0.04	-0.03	0.73	-0.09	-0.08
Amber	3.19	3.86	2.90	40	26	22	0.26	0.40	0.35	1.70	1.88	1.51
PG Electroplast	2.66	3.78	3.57	52	53	57	1.10	1.27	0.17	3.87	2.85	0.68
Epack Durables	4.81	4.11	2.55	103	81	72	2.67	1.33	0.25	4.72	4.07	1.93

Source: Annual Reports of Companies published in RoC, MCA; Frost & Sullivan Analysis

Fixed Asset Turnover Ratio = Revenue from Operations / Average GFA (Gross Fixed Asset) | GFA (Gross Fixed Asset) = {Gross Property, Plant and Equipment + Capital Work in Progress}; Cash Conversion Cycle: Trade Receivable Days + Inventory Turnovers Days – Trade Payable Days

About Ajay Poly Ltd.

Company Overview

Ajay Poly Limited (APL), founded in 1991 and part of the DCJ Group, specializes in the manufacture of polymer extruded and glass products, catering to key industries such as home appliances. The company's close collaboration with both multinational and Indian OEMs in design and development gives it a significant competitive edge. These joint development efforts foster innovation and create a formidable barrier to entry for new competitors, as replicating Ajay Poly's depth of expertise and strategic alliances is a significant challenge. Ajay Poly is India's leading manufacturer and supplier of refrigeration sealing systems (Gasket Assemblies) and Extruded Profiles used in appliances, with a market share of approximately 61.0%, 65.2% and 49.0% in Gasket Assemblies, 25.2%, 26.4% and 21.0% in Rigid Profiles and an overall market share of 45.9%, 48.9% and 37.5% in Extruded Profiles used in Appliances, in FY2024, FY2023 and FY2022 respectively. Ajay Poly is also one of India's leading manufacturer and supplier of Toughened Glass Products used in Appliances, with a market share of 31.3% in Refrigerator Glass Shelves, 20.1% Market Share in Refrigerator Glass Doors, 27.3% market share in Microwave Glass Doors, and an overall market share of 15.4% in Toughened Glass used in Appliances, in FY2024.

Key Products

Ajay Poly offers a broad range of products critical to the consumer durables industry:

- **Extruded Polymer Products**: Refrigerator door gaskets, thermoplastic extrusions, co-extruded sheets.
- **Toughened Glass Products**: Refrigerator glass doors and shelves, microwave oven glass, washing machine glass, cooktop glass.
- **Magnetic Products**: Magnetic strips, magnetic sheets, and printed magnetic sheets.
- **Raw Materials/Other Products**: Barium/Strontium ferrite powder, PVC compound, and Epoxidised Soyabean Oil.

Industries Served

The company serves multiple industries, focusing mainly on home appliances, refrigeration, and consumer electronics. Its product offerings are crucial components in products such as refrigerators, washing machines, microwaves, cooktops, and Visi Coolers.

Plant Locations

Ajay Poly operates multiple manufacturing units across India, strategically located in key regions to support its wide-ranging operations. The manufacturing facilities of Ajay Poly are strategically located in appliance manufacturing hubs of India The company has five manufacturing units in Greater Noida, along with additional facilities in Mohali, Pune (Karegaon, and Shirwal), Sanand (Gujarat), and Chennai. These strategically placed facilities are situated in appliance manufacturing hubs. This diverse geographical footprint enables the company to serve a large customer base efficiently, ensuring the production of critical components like polymer extrusions, toughened glass, and magnetic products for industries such as home appliances and consumer electronics.

Backward Integration

Ajay Poly's manufacturing process is significantly strengthened by backward integration, enabling the company to produce critical raw materials and components in-house. This ensures control over quality, costs, and supply chain reliability. Their operations are integrated across the product cycle, with almost all manufacturing processes carried out internally. This allows them to respond quickly and efficiently to

customer requirements or changes in global conditions without relying on external vendors. Consequently, they can closely monitor product quality, production costs, and delivery schedules. This includes:

- **Polymer Extruded Products**: Production of gaskets used in refrigerator doors, rigid profiles for refrigerators, Visi Cooler doors, deep freezer tops, and refrigerator inner molds.
- **Toughened Glass**: Manufacturing toughened glass for refrigerator shelves and doors, washing machines, microwaves, cooktops, and other appliances such as air conditioners and water dispensers.
- **Magnetic Products**: Production of Barium Ferrite powder, which is used in the manufacturing of magnetic strips through extrusion.