Market Intelligence
& Analytics

CRISIL
An S&P Global Compa

Industry assessment - Device harness, Main harness, Terminals, Connectors and Switches

Viney Corp

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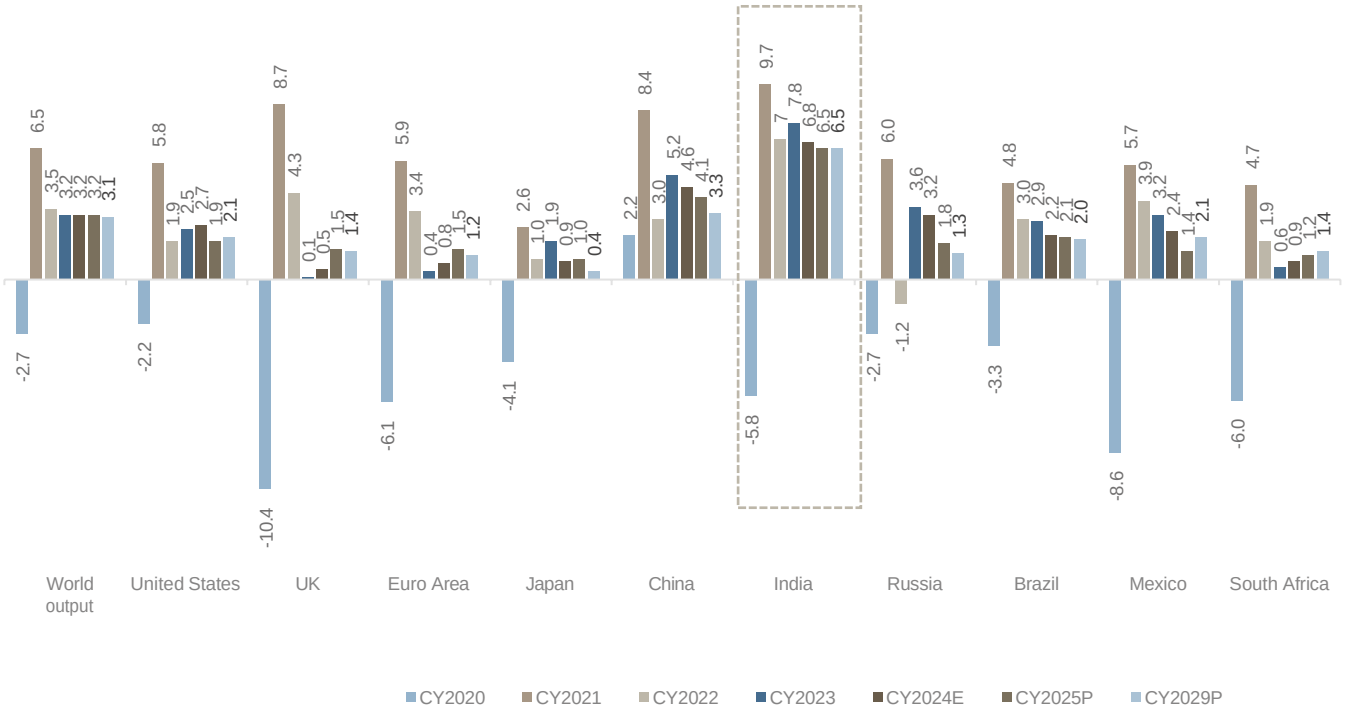
Overview of the Global Economy

Review and outlook of global GDP

The global economy continues to recover from the challenges heaped by the COVID-19 pandemic, Russia's invasion of Ukraine, Red Sea crisis and considerable tightening of global monetary conditions to address elevated inflation. However, a return to pre-pandemic growth trajectory seems increasingly challenging, particularly in the case of emerging and developing economies due to the convergence of several forces that are holding back a steady recovery. Some of these are long-term fallouts of the pandemic, the war in Ukraine, and increasing geoeconomic fragmentation. Other cyclical factors include elevated central bank policy rate to control inflation in several large emerging markets and developed economies, a withdrawal of fiscal support amid high debt levels, and extreme weather events. However, India witnessed strong growth momentum despite these geopolitical tensions and uncertainties in the global economic environment. A major push to economic growth has been fueled by investments in key sectors such as information technology, services, agriculture, and manufacturing.

GDP growth of key economies



Note: On Calendar Year (CY) basis

** Euro area comprises 19 member countries of the EU*

Source: International Monetary Fund (IMF; World Economic Outlook – April 2024 update), CRISIL MI&A

As per World Economic Outlook by International Monetary Fund (IMF):

The global GDP growth is estimated at 3.2% in the CY2024 with the forecast 0.1% higher than the previous estimates due to the upgrades for China, the United States (US), large emerging markets and developing economies. The forecast for CY2024 is however, below the historical (CY2000-2019) annual average of 3.8% with elevated central bank policy rates to fight inflation, a withdrawal of fiscal support by major economies amid high debt weighing on economic activity and low underlying productivity growth.

In case of advance economies, which include the US, Japan and Euro area, the growth is projected to rise from 1.6% in CY2023 to 1.7% in CY2024.A marginal upward revision of 0.2% for CY2024 compared with previous estimates is due to stronger growth momentum in the US that is partly offset by weaker growth in the Euro zone.

The growth rate in emerging market and developing economies which include China, India, Russia, Brazil, Mexico, and South Africa is expected to remain at 4.2% in CY2024 and CY2025, with a moderation in emerging and developing Asia such as India and China's growth offset mainly by rising growth for economies in Middle East and Central Asia and for Sub Saharan Africa. Emerging and developing economies are expected to experience stable growth through 2024 and 2025 albeit with some regional differences.

The Real gross domestic product (GDP) growth rate of the US was revised down to 2.5% in CY2023 to 2.1%in CY2024. There was an upward revision of 0.6% for CY2024 from the previous estimates, largely due to stronger than expected growth outcome for 2023.

Growth for the Euro zone is projected to recover from its low rate of an estimated 0.4% in CY2023 which was due to high exposure to the war in Ukrain to 0.8% in CY2024. Stronger household consumption due to the decrease in energy prices and drop in inflation is supporting real income growth and is expected to drive the recovery. Growth is revised downward from the previous estimates, largely on account of carryover from the weaker than expected outcome for CY2023.

Among other advance economies, growth in the United Kingdom is projected to rise modestly from an estimated 0.1% in CY2023 to 0.5% in CY2024, due to lagged negative effect of high energy prices. Outputs in Japan is projected to slow from an estimated 1.9% in CY2023 to 0.9% in CY2024.This is due to fading of the one-off factor that supported growth in 2023, including surge in inbound tourism depreciation of the Yen, pent up demand, and a recovery in business investment following earlier delays in implementing projects.

Growth in emerging and developing countries of Asia is expected to decline from an estimated to 5.6% in CY2023 to 5.2% in CY2024. Growth in China is projected at 4.6% in CY2024 due to carryover from stronger than expected growth of 5.2% in CY2023 and increased government spending on capacity building against natural disasters. India is the fifth largest economy and among the fastest growing major economies. Growth in India is projected to remain strong at 6.8% in CY2024 and 6.5% for CY2025 with the strong growth led by continuing strength in domestic demand and a rising working age population.

Economic activity in major developed countries was also resilient, with economic momentum continuing in the US and the Euro zone avoiding a contraction in the fourth quarter of CY2023. Growth picked up in the fourth quarter of CY2023 in China as well. However, the slowdown in the UK economy accelerated in the fourth quarter of 2023, with a recession now being recorded. Japan's economy too slowed down in the fourth quarter of CY2023.

Meanwhile, the Global headline inflation is expected to fall from an average of 6.8% in CY2023 to 5.9% in CY2024 mainly due to decline is expected for Advanced economies, with inflation decline by 2% in CY2024.The fall in global inflation in CY2024 reflects a broad-based decline in global core inflation (all item except food and energy). This dynamic differs from that in 2023, when global core inflation fell marginally on an annual average basis and headline inflation declined mainly on account of lower fuel and food price inflation. In CY2024, core inflation is expected to fall by 1.2% after contracting by 0.2% in CY2023.As in case of headline inflation, the fall in core inflation is faster for advanced economies. Diminished inflation reflects the fading of relative price shocks notably energy prices. In near term, inflation expectations have fallen in major economies with long term expectations remaining anchored.

Review and outlook of inflation in key economies

There is regional divergence on the inflation front in the United States, the disinflation process remains uneven. S&P Global Ratings does not expect the Federal Reserve to cut rates before June. Inflation in the Euro zone eased further in March 2024 but remains above the European Central Bank's target. On the other hand, inflation in Japan continued to ease in March, but remained above the Bank of Japan's target. China's prices came down in March, the slowdown came as the effect of the Lunar New Year waned and with non-food inflation easing.

US inflation inches up while unemployment decreases

- According to a Bureau of Economic Analysis (BEA), US GDP grew at 3.4% in the fourth quarter of CY2023, lower than 4.9% in the previous quarter. Consumer expenditure grew 0.7% month-on-month in December 2023, up from 0.4% in the previous month.
- The US labour market remained robust, adding 303,000 non-farm payroll jobs in March 2024, which was up from 270,000 in February 2024 and above the average monthly gain of 231,000 in the previous twelve months. However, the unemployment rate rose to 3.8% in March 2024 compared to 3.9% in the February 2024.
- US inflation grew to 3.5% in March 2024 from 3.2% in the previous month, driven by resurgence in energy price inflation. The energy inflation rose to 2.1% in March 2024 compared to a 1.9% fall in February 2024. However, food inflation remained steady in March 2024 at 2.2%. Core inflation eased to 3.8% in March 2024.
- Goods and services trade deficit widened to USD 68.9 billion (seasonally adjusted) in February 2024, compared with USD 64.2 billion in January 2024, as exports rose 1.8% month-on-month versus imports growth of 0.8% in February 2024
- Given the resilience of economic activity and the uneven disinflation process, S&P Global Ratings does not expect a rate cut before the Federal Reserve's June 2024 meeting.

Economic activity sprouts green shoots in the Euro Area

Euro zone GDP held steady at 0.0% growth on-quarter (seasonally adjusted) in the fourth quarter of 2023, against a 0.1% contraction in the previous quarter. Fourth quarter performance was mixed, with Italy (0.2%) and Spain (0.6% provisional) growing on-quarter while Germany (-0.3% estimated) contracted and French growth remained at 0.0%.

The HCOB Eurozone Composite Purchasing Managers' (PMI) Output Index, which is a weighted average of the HCOB Manufacturing PMI Output Index and HCOB Services PMI Business Activity Index, rose to ten months high of 50.3 in March 2024 from 49.2 in February 2024.The March reading indicates the Euro area economy has expanded for the first time since May 2023.

According to the flash estimate from Eurostat, inflation in the Euro area eased to 2.4% in March 2024 from 2.6% in February 2024, driven by moderation across most categories. Inflation eased significantly in the food related category (2.6% versus 3.9% in February 2024) while energy prices continued to decline as well (-1.8% versus -3.7% in February 2024). 'Core' inflation, except food and energy, eased further (2.9% from 3.1% in February). Inflation in non-energy industrial goods eased (1.1% versus 1.6% in February 2024) while services inflation remained steady at 4.0%.

The European Central Bank held the policy rates steady at its March meeting for the fourth consecutive time, as inflation remains above its target despite some easing.

Euro zone merchandise exports increased 0.3% y-o-y in February 2024, while imports fell by 8.4% This led to a trade surplus of EUR 23.6 billion in February 2024 compared with EUR 3.6 billion in February 2023.

Consumer price inflation (on-year, %)

	Jul-23	Aug-23	Sep-23	Oct-23	Nov-23	Dec-23	Jan-24	Feb-24	Mar-24
US	3.2	3.7	3.7	3.2	3.1	3.4	3.1	3.2	3.5
UK	6.8	6.7	6.7	4.6	3.9	4.0	4.0	3.4	3.2
Euro zone	5.3	5.2	4.3	2.9	2.4	2.9	2.8	2.6	2.4
Japan	3.3	3.2	3.0	3.3	2.8	2.6	2.2	2.8	2.6
China	(0.3)	0.1	0.0	(0.2)	(0.5)	(0.3)	(0.8)	0.7	0.1
India	7.4	6.8	5.0	4.8	5.5	5.6	5.1	5.1	4.9

Source: Statistical Bureau, respective countries

UK manufacturing begins to expand; inflation eases significantly

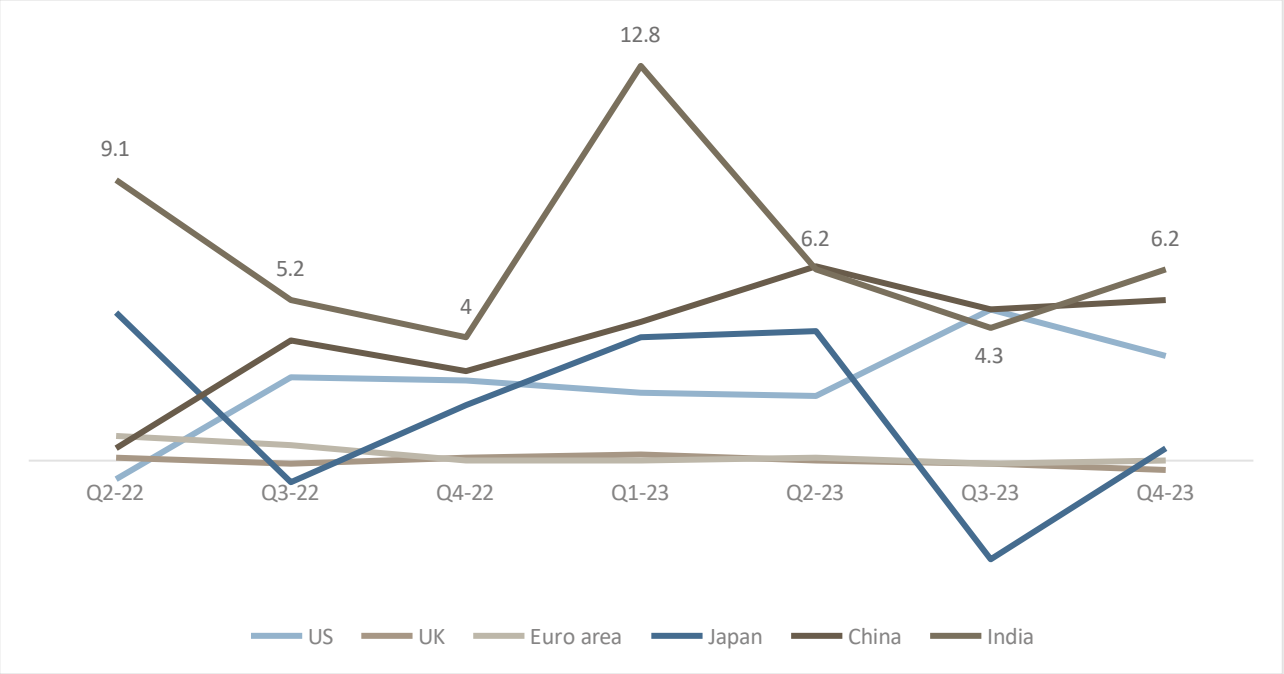
S&P Global UK Manufacturing Purchasing Managers' Index (PMI) increased to 50.3 in March from 47.5 in February. The March reading marks an expansion in manufacturing activity for the first time since July 2022. S&P Global UK Services PMI Business Activity Index decreased to 53.1 from 53.8. While this was above the neutral 50.0 threshold, it signalled the slowest pace of business activity expansion since November 2023.

The UK's real GDP contracted 0.3% in the fourth quarter of CY2023, a sharper fall compared to the 0.1% contraction recorded in the third quarter. From an output perspective, all three major sectors contracted. Output in the construction sector contracted the most (1.3%), followed by the production sector (1.0%) and the services sector (0.2%). A decline in a manufacturing output was the main driver of the contraction in the production sector, while a contraction in wholesale and retail trade was primarily responsible for declining output in the services sector.

Inflation eased significantly to 3.2% in March 2024 from 3.4% in February 2024, on the back of lower service and goods inflation. The latter was driven by significant reduction in food and non-alcoholic beverages inflation from 5% in February 2024 to 4% in March 2024. Housing and household services, and motor fuels exerted the highest upward pressure on the annual inflation rate, whereas food contributed to the largest downward pressure. Core inflation eased to 4.2% in March 2024 from 4.5% in February 2024. At its meeting that ended January 31, the Bank of England held its policy rate steady at 5.25%.

Goods and services trade deficit narrowed to GBP 2.3 billion (seasonally adjusted) in February 2024 from GBP 2.2 billion in January 2024.

GDP growth (Q-o-Q SA annualised, %)



Source: Statistical Bureau, respective countries

Inflation picks up sharply in Japan

The Japanese economy contracted by an annualized rate of 0.4% in the fourth quarter of CY2023 due to weaker private consumption amid high domestic inflation.

The au Jibun Bank Japan Manufacturing Purchasing Manager Index (PMI) rose to 48.2 in March from 47.2 February, marked the tenth straight month of contraction in manufacturing activity. The contraction was, however, at its lowest in four months. Conversely, services activity continued expand in February, as indicated by the au Jibun Bank Japan Services Business Activity Index, through the index rising to 54.1 in March 2024 from 52.9 in February 2024.

Japan's core inflation slowed in March due to mild rises in food prices above the central bank's 2% target. Core consumer price index rose to 2.6% in March from 2.8%in February 2024.It was the first time since November 2022 that index fell below 3%.

During its March meeting, the Bank of Japan ended the negative interest rate and yield curve control policy in place since 2016, stating that it will maintain the key short-term interest rate between 0-0.1%. The Bank's decision was based on healthy wage growth in the economy (corporates have been revising up wage growth rates) and the fact that despite easing, inflation remains above the 2% target.

Japan trade deficit decreased to JPY 377.8 billion in February 2024, compared with a deficit of JPY 928.9 billion in February 2023, as exports grew 7.8% year-on-year, while imports increased at a softer 0.5%. The first rise in 11 months, to JPY 8628.57 billion, as domestic demand started to recover. In 2023, Japan logged a trade shortfall of JPY 9.29 trillion, the third successive year of gap.

Manufacturing picks up pace in China

The Chinese economy grew by 5.3% in the first quarter of CY2024, slightly up from 5.2% in the fourth quarter of CY2023. Manufacturing activity began to expand in March 2024. The official National Bureau of Statistics (NBS) Manufacturing Purchasing Managers' Index stood at 50.8 in March compared with 49.1 in February. On the other hand, non-manufacturing activity continued to expand. The NBS Non-Manufacturing Business Index picked up to 53.0 in March 2024 from 51.4 in February 2024.

Inflation decreased to 0.1% in March 2024 from 0.7% in February 2024. Inflation declined in the food and tobacco (-1.4% vs -0.1%), with non-food items inflation easing (0.7% versus 1.1%). 'Core' inflation, except food and energy, inched up as well (0.6% versus 1.2%). The People's Bank of China kept its one-year Loan prime rate unchanged at 3.45% in March 2024 however, it has been attempting to increase liquidity in the system and aid recovery. China's total trade surplus widened to USD 39.7 billion in February 2024 from USD 16.8 billion in February 2023 as export increased 5.6% while imports declined by 8.2%

India to be the fastest growing large economy

India's growth trajectory continued throughout fiscal 2024 wherein India's GDP expanded at 7.8% in the first quarter, 7.6% in the second quarter and 8.4% in the third quarter. Core sector growth in February 2024 was the fastest in three months and manufacturing activity at five months high. Economic growth was encouraged by investment and manufacturing activity.

Consumer price index (CPI) inflation eased to five months low of 4.9% in March from 5.1% in February 2024. However, core inflation tapered to 3.2% in March 2024 from 3.3% in February 2024. Fuel inflation also tapered in March 2024 due to cut down in domestic fuel prices such as petrol and diesel. High food inflation at 8.5% in March 2024 due to higher cereals inflation, erratic vegetable inflation and elevated pulses inflation are a cause of concern given the Indian Meteorological Department's (IMD) prediction of higher-than-normal temperatures between April and June.

The Reserve Bank of India's (RBI) Monetary Policy Committee (MPC) voted to keep the policy rates unchanged with a 5-1 majority. The repo rate remains at 6.50% in April 2024. The MPC noted encouraging signs for food inflation easing on the back of an expected bumper rabi output in the current season and a normal monsoon. However, it will remain vigilant about unpredictable weather events, the frequency of which has increased in recent years. The MPC kept its consumer price index (CPI) inflation forecast unchanged at 4.5% for this fiscal.

The International Monetary Fund in its latest report indicated that India's gross investments as a percentage of GDP is expected to rise 31.9% in Fiscal 2025 from 31.7% in Fiscal 2024. The National Statistical Office (NSO) reported that manufacturing output rose by 5% in February 2024 which is slightly lower as compared to 5.9% in February 2023. Industrial production expanded by 5.7% in February 2024. Mining production surged by 8% while power output grew by 5.7% in February 2024. India's merchandise trade deficit widened to USD 18.71billion in February 2024 from USD 17.49 billion in January 2024, as imports surpassed exports in value terms against the backdrop of the Red Sea conflict.

The Indian economy is expected to grow at a higher than estimated 7.6% in fiscal 2024, with GDP growth in the third quarter of the fiscal at 8.4% on the back of lower base, tax collections and healthy growth in the manufacturing sector and construction activities. Data released by the NSO in February 2024 revealed that the economy is expected to grow by 7.6% in fiscal 2024 as against the previous estimates of 7.3%.

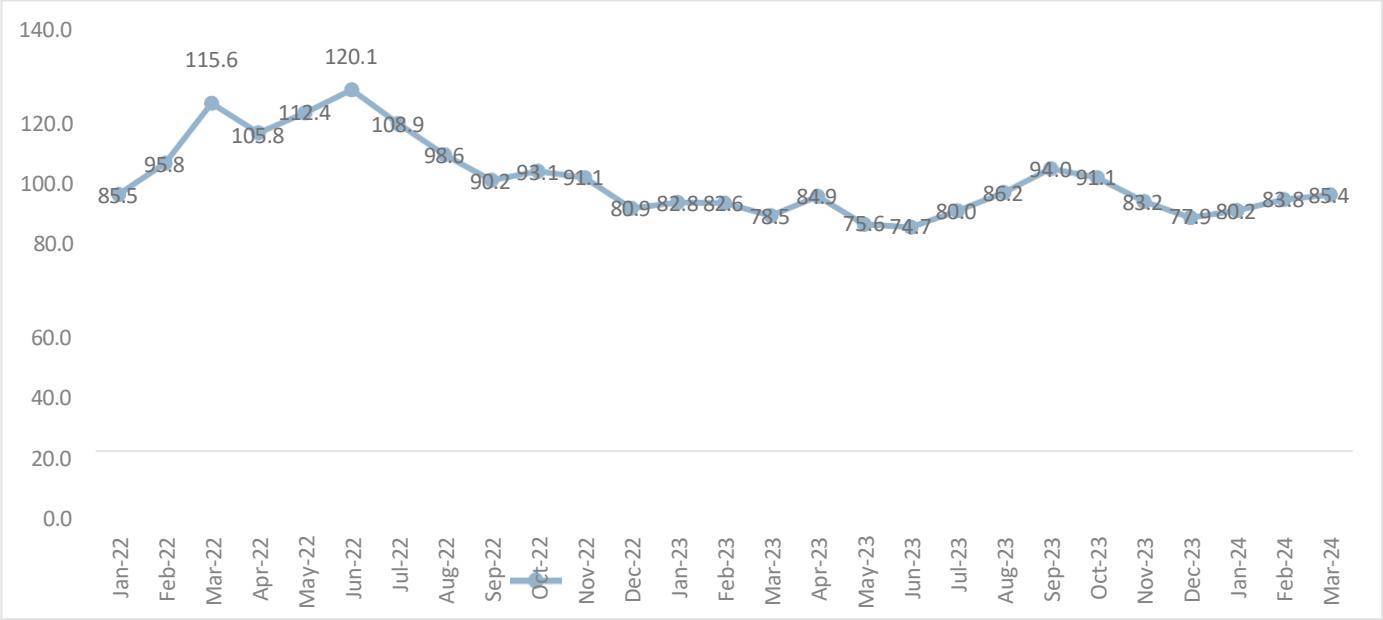
As per CRISIL MI&A, India's economy is expected to grow at 6.8% in fiscal 2025 up from 6.5% projected earlier. This will be driven by expected easing of domestic financial conditions, disinflation leading to increasing purchasing power of consumers and growth in private capital expenditure.

Energy prices increase, as oil prices inch up further

Energy prices witnessed a 2% growth in March 2024 as compared to February 2024. The growth caused Brent crude prices to average USD 85.4 per barrel in March 2024, which grew from USD 83.8 per barrel in February 2024. The hike in crude oil prices was fueled by ongoing tensions in the Middle East, drone attacks against Russian refineries and expectation of extended production cuts by Russia. Additionally, this price surge was due to continued tightening of the global oil supply, largely attributed to the sustained oil production cuts implemented by Organisation of Petroleum Exporting Countries (OPEC). A drop in US crude stocks indicates strong demand from the biggest oil consumer in the world along with the robust demand from China, which also supported hike in crude oil prices.

CRISIL MI&A expects crude oil prices to increase on a month-on-month basis with an expected average ranging between USD 88-93/barrel. There are multiple factors that will influence the oil market dynamics. Continuation of Middle eastern tension will keep prices elevated. A stable macroeconomic situation resulting in stable demand will further keep crude prices elevated in the month of April ,2024.

Brent crude prices (USD/barrel)



Sources: CRISIL MI&A

In February 2024, Brent crude prices rose to 4.5%, a pickup from the 3.0% increase in January 2024. Brent crude prices averaged USD 83.8/barrel in February, up from USD 80.2/barrel on average in January on the back of continued geopolitical uncertainty, leading to the rerouting of barrels. The prices remained below the September level of USD 94.0/barrel. Australian coal prices declined 0.6% to USD 124.2/metric tonne from USD 124.9/metric tonne.

The Organization of Petroleum Exporting Countries (OPEC) and its allies OPEC+ led by Saudi Arabia and Russia agreed to extend Voluntary oil output cuts by 2.2million barrel per day into the second quarter of 2024.The decision of the OPEC+ coupled any further escalation in the Red Sea crisis will be the key factors affecting crude oil prices. Global energy prices increased 1.1% in February 2024, slower than the 1.6% rise in January 2024.

Global trade environment

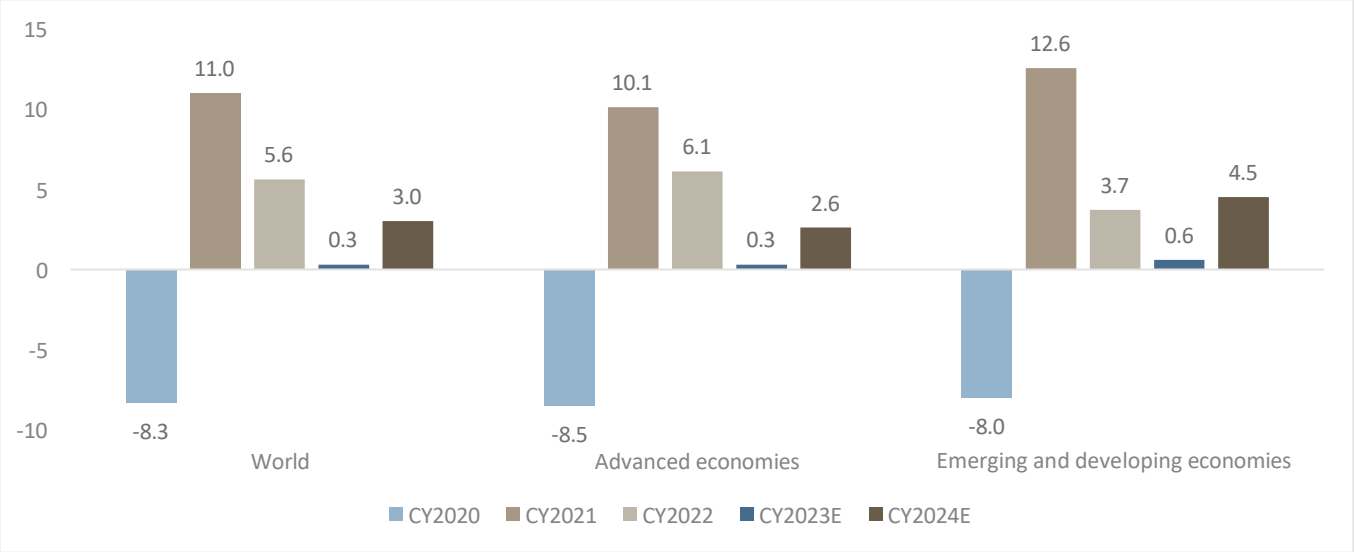
The value of global merchandise trade has experienced continuous decline since mid-2022. However, trade in services-maintained growth throughout most of the period.

The decline in the value of global trade throughout 2023. was primarily driven by reduced demand in developed countries and trade weaknesses within East Asia and Latin America regions. Lower commodity prices further contribute lowering the value of international trade in 2023. However, trade in services saw growth for most of 2023. Among services tourism and travel related services rebounded strongly. Both merchandise and services trade stabilised quarter-over quarter, indicating the end to the decline in global trade of goods, and the end of the strong upward trend in trade in services.

The volume of trade stayed modest throughout 2023.The slightly positive trend in the volume of international trade suggests a resilient global demand for imported products. A weak United States Dollar also supported global trade volumes during 2023.

Global trade growth is projected at 3.0% in 2024.The projections for 2024 are more optimistic even as overall moderating global inflation and improving economic growth forecast suggest a reversal of the downward trends. The global trade outlook for 2024 remains subject to significant uncertainties. Persistent geopolitical tensions, rising shipping costs, and high levels of debt weighing on economic activity in many countries may have negative influence on global trade.

IMF world trade growth projection



Advanced economies – US, Japan, Euro area; emerging market and developing economies – China, India, Russia, Brazil, Mexico, South Africa
Note: Average annual % change of export and import trade in goods and services has been considered
Source: IMF (World Economic Outlook – April 2024 update), CRISIL MI&A

Key events and their impact on Global Economy

Red Sea attacks disrupt Global Trade

In the past few months, global trade has been held back by disruption at two critical shipping routes. Attacks on vessels in the Red Sea reduced traffic through the Suez Canal - the shortest maritime route between Asia and Europe - through which about 15% of global maritime trade volume normally passes. Several shipping companies diverted their ships around the Cape of Good Hope. This led to an increase in delivery times especially for companies with limited inventories. A severe drought at the Panama Canal has forced authorities to impose restrictions that have substantially reduced daily ship crossing, slowing down maritime trade through another key chokepoint that usually accounts for 5% of global maritime trade. In the first 2 months of 2024, Suez Canal trade dropped by 50% from year earlier while trade through the Panama Canal fell by 32%, disrupting supply chains and distorting key macroeconomic indicators.

Commodity price spikes amid geopolitical and weather shocks

The conflict of Gaza and Israel could escalate further into the wider region, which produces about 35% of the world's oil export and 14% of gas exports. Risks due to continued attacks in the Red Sea and the ongoing war in Ukraine are generating fresh adverse supply shocks to global recovery, with spike in food, energy, and transportation costs. Container freight cost have sharply increased since October 2023 till January 2024 as the situation in Middle East remains volatile. Further geoeconomic fragmentation could also constrain the cross-border flow of commodities causing additional price volatility. Extreme weather shocks, including floods and droughts, together with the EI Nino phenomenon, may cause food prices to hike that may lead to food insecurity and put risk to global disinflation process.

Tighter monetary policy stance

A slower than expected decline in core inflation in major economies owing to persistent labor market tightness and supply chain disruptions could impact rise in interest rate expectation and fall in asset prices. Such developments could increase financial stability risks, tighten global financial conditions, and strengthen the US dollar, with adverse consequences for trade and growth.

Key global central banks have raised rates at a rapid pace in 2023, as several advanced economies were plagued by inflation. In the current cycle, the US Fed and Bank of England have raised rates by 525 bps, while the European Central Bank has raised rates by 450 bps. In the last few months, however, these central banks have held interest rates steady as inflation moves closer to the 2% target. The Fed is at a turning point and has indicated that it will cut rates by a cumulative 75 bps in 2024.

Faltering growth in China

With a substantial share of economies' exports absorbed by China, a weaker-than-expected recovery in China would have significant cross-border effects, especially for commodity exporters. Fixed investment has weakened, which indicates weakness in external demand. Un intended fiscal tightening in response to local government financing constraints is also possible, which will also reduce household consumption due to subdued confidence. Risks to the outlook include ongoing weakness in the Chinese real estate market, which could pose a larger-than-expected drag on growth and potentially lead to financial stability risks.

India-US trade talks

The US had communicated in August 2021 to India that it is not interested in a free trade agreement (FTA). India was pulled out of the US's Generalized System of Preferences (GSP) that granted some tariff relief to its exports by the Trump government in 2019.

The government will have to work on market access issues on both sides, lowering of non-tariff barriers, mutual recognition pacts and adopting common quality standards can also help Indian exports in the interim. There is a possibility that even these issues, which include providing access to US agricultural products or easing import duties on automobiles, etc.

The strong momentum witnessed in the India-US bilateral trade in goods and services has continued to rise and has likely surpassed USD 200 billion in calendar year 2023 despite the challenging global trade environment. The bilateral goods and services trade between US and India has almost doubled since 2014, it shows accelerated growth benefitting both countries that was also highlighted in the latest India - United States Trade Policy Forum in January 2024.

Beyond trade, India and the US have strong ties in various policy areas. They regularly collaborate on initiatives such as the Indo-Pacific Economic Framework for Prosperity (IPEF), aimed at countering China's influence in South and Southeast Asia. The two nations have also resolved seven disputes at the World Trade Organization (WTO), underlining their deepening cooperation.

Trade deficit narrows

The global economy is set for broadly steady expansion in 2024, IMF World economic outlook Jan 2024 projected global growth of 3.3% in 2024 and 3.6% for 2025. Major economies had witnessed downturn in merchandise trade during 2023.The notable exception is the Russian Federation, for which import grew by 6%in 2023. However, this increase must be due to currency fluctuation and the very low base of 2022. Russian federation saw a sharp decline in export level in 2023 largely tied to energy markets. On the other hand, Brazil and European union recorded small positive growth rates in export during 2023. Quarter-over-quarter statistics indicate return to growth in some major economies, including China and India. Overall, the comparison of annual and quarterly growth suggests significant improvement in trends for several economies, however the overall statistics for 2023 remain negative.

The decline in global trade has been more pronounced for developing countries. During 2023, imports and exports of developing countries declined by an average of 5 and 7 per cent, respectively. Conversely, trade for developed countries decreased by about 4 per cent for imports and 3 per cent for exports. Quarter-over-quarter figures indicate a positive trend for developing countries, while trade of developed countries has remained stable. Regarding South-South trade (developing countries excluding East Asia), the stronger-than-average decline during much of 2023 reversed in Q4 2023, with a quarter-over-quarter growth of about 3 per cent.

Most regions have undergone negative trade growth in 2023. The exception was a significant increase in intra-regional trade for the African region. Notably, during 2023 the region comprising the Russian Federation and Central Asian economies registered a strong decrease in exports but also a strong increase in imports. East Asian trade exhibited notable weakness throughout 2023, also in relation of intra-regional trade. During the last quarter, trade remained weak in Latin America and in the region comprising the Russian Federation and the Central Asian economies. Conversely, trade growth was positive for Africa and East Asia.

WTO negotiation: India secures multilateral victory, upholds principle of fair trade

The WTO is a system of rules that aims for fair and open competition. The WTO has 164 members countries, which represents over 98% of global trade.

By January 2023, a total of 61 WTO members that were participating in the Joint statement initiative on service domestic regulation (JSI on SDR) had submitted requests for certification of their updated General Agreement on Trade in Services (GATS.)

India along with South Africa, has achieved a breakthrough in World Trade Organisation negotiations on domestic service regulations. After objections to certification requests for updated GATS, India withdrew objections following consultations. India emphasized adherence to multilateral processes, ensuring non-discrimination principles.

India's key objective was reiterated during meeting and outlined in the revised certification requests of the WTO member involved. WPDR agreed on the course of action for those WTO members aiming to include regulations on domestic matters in their GATS schedules as additional commitments. This outcome addressing a topic mandated by multiple parties within multilateral forum, reaffirmed India's commitment to preserving the multilateral nature of WTO.

Regional Comprehensive Economic Partnership (RCEP)

RCEP is a multilateral FTA between Australia, China, Japan, New Zealand, South Korea, and member states of the Association of Southeast Asian Nations (ASEAN, composed of Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, the Philippines, Singapore, Thailand, and Vietnam). The 15-member states account for ~30% of the world's population and nearly 30% of global GDP. RCEP is the world's largest free trade agreement by members' GDP.

RCEP countries have agreed to progressively abolish 90% of all tariffs on goods between participating members. The agreement also simplifies customs procedures and rules of origin laws between countries. Rules of origin restrictions generally tend to constrain the development of regional supply chains, which means the new provision will reduce the potential regulatory friction for firms and countries in terms of trade.

On November 2019, India decided to opt out of RCEP in the middle of the negotiations. India has trade deficit with 11 out of the 15 RCEP countries and the content of the RCEP deal did not provide protection for the Indian economy. India's reservations were related to tariff commitments, investments, electronic commerce, rules of origin and auto trigger mechanisms. Further, given the economic slowdown then, the Indian government faced tremendous pressure from different sections of the industry and political organisations to not join the RCEP. Various ministries such as agriculture, steel, chemical and MSME had also opposed the deal.

Joining the RCEP would have made India a part of the rule making body of what was supposed to be the largest trade agreement in the world. The RCEP was also expected to push India to pursue much needed domestic reforms to make the manufacturing sector more competitive. India already had bilateral FTAs with ASEAN, Korea, Japan and negotiations were underway with Australia and New Zealand. India, therefore, had familiarity with these economies. However, the inclusion in the RCEP of China, with whom India had a trade deficit USD 54.7 billion in 2018 - that accounted for half of the country's total trade deficit - was a cause of concern for India's negotiators.

Japan and the other RCEP member states have strongly desired India to come back and join the RCEP. From a Japanese perspective, India's return to RCEP would contribute to strengthening the Australia-India-Japan security network vis-à-vis the rising Chinese military presence in the Indo-Pacific region. Hence, the Japanese government has consistently encouraged India to return to the RCEP framework, stating that joining RCEP would provide India with greater market access and would help the entire region prosper.

Overview of the Indian Economy

Review of real GDP growth over fiscals 2019-2024 and outlook for fiscals 2024-2029

India ranks as the world's 5th largest economy and is the fastest growing among major economies. The Indian economy logged 4.3% CAGR between fiscals 2019 and 2024 (till Q3). This was a sharp deceleration from a robust 6.7% CAGR between fiscals 2017 and 2019, which was driven by rising consumer aspiration, rapid urbanisation, the government's focus on infrastructure investment and growth of the domestic manufacturing sector. Economic growth was supported by benign crude oil prices, soft interest rates and low current account deficit. The Indian government also undertook key reforms and initiatives, such as implementation of the Goods and Services Tax (GST), Insolvency and Bankruptcy Code, Make in India, financial inclusion initiatives, and gradual opening of sectors such as retail, e-commerce, defence, railways, and insurance for foreign direct investments (FDIs).

A large part of the lower growth between fiscals 2018 and 2023 was because of the economy contracting 5.8% in fiscal 2021 owing to the fallout of COVID-19. The pandemic's impact was more pronounced on contact-sensitive services and social distancing norms affected services such as entertainment, travel, and tourism, with many industries in the manufacturing sector also facing issues with shortage of raw materials/components as lockdown in various parts of the world upended supply chains.

Over the period, India's economic growth was led by services, followed by the industrial sector. In parts, though, growth was impacted by demonetisation, the non-banking financial company (NBFC) crisis, slower global economic growth, and the pandemic.

As lockdowns were gradually lifted, economic activity revived in the second half of fiscal 2021. After a steep contraction in the first half, owing to rising number of COVID-19 cases, GDP moved into positive territory towards the end of fiscal 2021. Subsequently, in fiscal 2022, India's real GDP grew 9.7% from the low base of fiscal 2021.

India's gross domestic product (GDP) exceeded expectations during first three quarters of fiscal 2024. According to the National Statistics Office (NSO), second advance estimates (SAE), real GDP accelerated to 8.4% on-year in the third quarter of fiscal 2024 from 8.1% in the second quarter. Growth of the past two quarters were revised up (second quarter was revised to 8.1% from 7.6%, and first quarter to 8.2% from 7.8%)

NSO now pegs GDP growth at 7.6% in fiscal 2024 compared with 7.3% as per the first advance estimates. Based on this second advance estimate, growth in the fourth quarter of this fiscal is estimated to slow to 5.9%. Additionally, the estimate for fiscal 2023 was revised to 7.0%, while for fiscal 2022 it was revised to 9.7%.

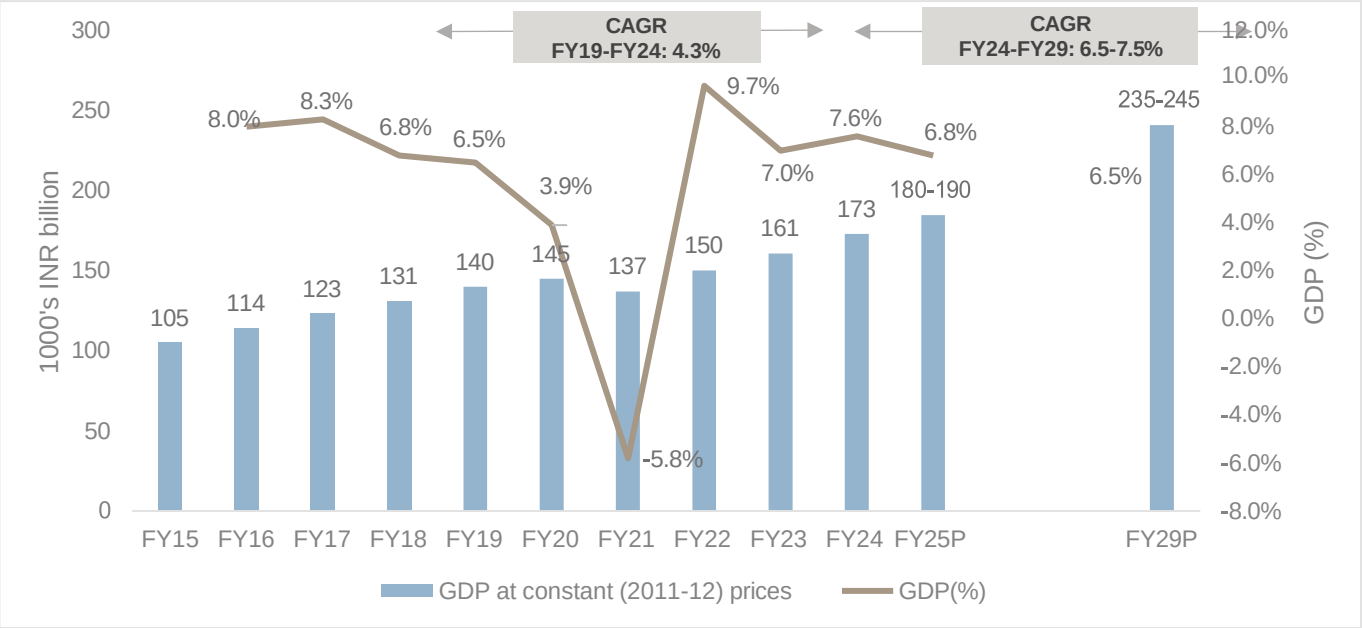
Growth surpassed forecasts in the second quarter of fiscal 2024, driven by strong government spending and a sharp rise in manufacturing and construction growth. Globally, growth in major economies such as the US and China beat estimates, contributing to better export earnings for India.

After a strong GDP estimate in the past three fiscals, CRISIL MI&A expects GDP growth to moderate to 6.8% in fiscal 2025. Fiscal consolidation will reduce the fiscal impulse to growth. Rising borrowing costs and increased regulatory measures could weigh on demand and net tax impact on GDP is expected to normalize. Exports could be impacted due to uneven growth in key trade partners and any escalation of the Red Sea crisis. On the other hand, another spell of normal monsoon and easing inflation could revive rural demand.

Reducing the fiscal 2024 deficit will reduce the government's direct support for economic growth, but investing in high-quality spending could still boost investment and rural incomes. CRISIL MI&A anticipates a return to normal

levels of indirect tax impact on GDP. However, uneven economic growth in major trade partners like the US and EU, along with escalating tensions in the Red Sea, may hinder exports.

India's GDP growth trend and outlook



Note: E - estimated and P - projected

Source: National Statistical Office (NSO), IMF, CRISIL MI&A estimates

In the third quarter of fiscal 24, fixed investments posted year on-year growth of 10.6% while private consumption (3.5%), despite a modest uptick, remained sluggish. The drag from net exports eased in the third quarter. From the supply side, growth was highest for manufacturing (11.6%), followed by construction (9.5%) and services (7.0%), while growth in agriculture contracted in the third quarter (-0.8%).

Similarly, growth in the fiscal year 2024 till Q3 has been driven by fixed investments (10.2% growth), while private consumption at 3.0% trailed overall GDP growth. On the supply side, industry grew the most (9%), followed by services (7.5%), while agriculture (0.7%) lagged.

Near-term review and outlook on GDP

Services sector is the key growth driver

In fiscal 2020, the services sector accounted for 55.3% of India's GDP compared with 52.4% in fiscal 2015. However, its share dipped to 53.6% in fiscal 2021 owing to the pandemic. Fiscal 2022 saw marginal improvement in the share of the services sector with gradual normalisation of market operations.

The industrial sector, which is the second-largest contributor, maintained its share in GDP of ~31%, logging 7.1% CAGR between fiscals 2015 and 2019. Industrial contribution declined in fiscal 2020, with slowdown in economic development. Before overall economic activity slowed down in fiscal 2020, India's industrial sector output growth was supported by the Make in India initiative, rising domestic consumption and GST implementation. The initiatives improved India's position on the World Bank's Ease of Doing Business index to 63 in fiscal 2019 from 142 in fiscal 2014.

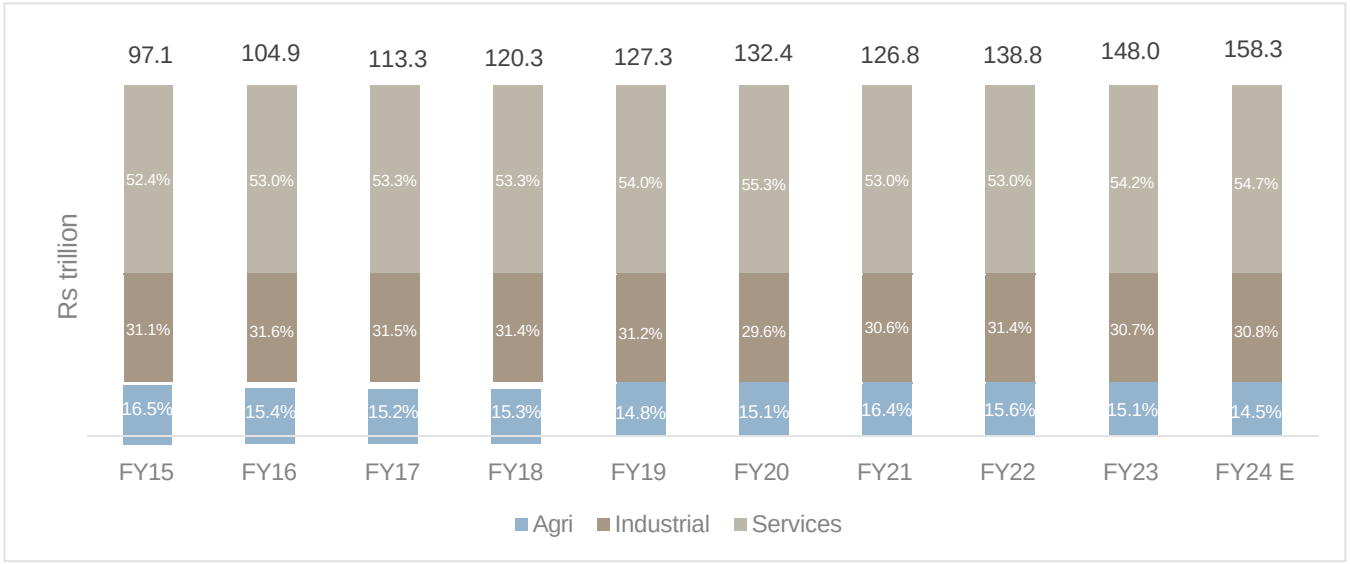
The pandemic and subsequent lockdown exacerbated the economic slowdown in fiscal 2021. The services segment was the worst affected and declined 8.2% year-on-year mainly due to the decline in Trade, Hotels, Transport, and Communication services (THTC) by 19.7% and decline in Public Administration, defence and other services by 7.6%, followed by industrial, which declined 0.9% on-year. Agriculture was the only sector that grew 4.1% on-year and restricted the fall in GDP.

In fiscal 2021, the agriculture sector's share in Gross Value Added (GVA) at constant prices expanded, while the share of the services and industrial sectors contracted.

In fiscal 2022, agriculture GVA grew at a rate of 3.5% and the industrial sector grew by 12% on a low base of fiscal 2021. Whereas the service sector grew by 8.8% year-on-year. This helped GDP to grow by 9.1%

Agriculture GVA continued to grow at a steady 4.0% in fiscal 2023. Faster GDP growth in fiscal 2023 saw the share of agriculture increase in the fiscal. The share of industrial sector in GDP grew 4% in fiscal 2023, strongly due to utility services with 8% growth, which was higher than all other industrial sectors. Mining grew by 5%, while manufacturing and construction added marginal growth momentum from a high base of fiscal 2022. The high base of fiscal 2022 led to moderate growth of the industrial sector in fiscal 2023. The services sector grew 9% in fiscal 2023. Trade, hotels, transport, and communication services (THTC) saw strong on-year growth of 14% in fiscal 2023.

Share of sector in GVA at constant prices



Source: RBI; CRISIL MI&A Consulting

The Agri sector is expected to grow at ~0.7% year-on-year in fiscal 2024, thereby contributing to 14.5% of the GVA. The services sector is expected to provide a thrust to the economy with 7.5% growth and 54.7% GVA share while the industrial sector will maintain a share of 30.8%.

Outlook on GDP

For the fiscal 2025, India's gross domestic product (GDP) growth is expected to moderate to 6.8% after a better-than-expected 7.6% expansion in fiscal 2024, given that high interest rates and lower fiscal impulse (from reduction in fiscal deficit to 5.1% of GDP) would temper demand and the net tax impact would normalize.

Additionally, uneven economic growth of key trading partners and escalation of geopolitical uncertainties can lower exports. But there will be support from other areas. Continued disinflation will prop up the purchasing power of consumers. Healthy rabi sowing and good kharif output (assuming another spell of normal monsoon is ahead) will bolster agricultural incomes. Further, a gradual pick-up in private capital expenditure (capex) will make investment growth more broad-based. The government has also provided budgetary support to rural incomes and infrastructure spending.

The lowering of fiscal deficit will mean curtailed fiscal impulse to growth, but good quality of spending would provide some support to the investment cycle and rural incomes. CRISIL also expects a normalisation of the net indirect tax impact on GDP witnessed in the current fiscal. Uneven economic growth in key trade partners such as the United States (US) and the European Union, and an escalation of the ongoing Red Sea tensions can act as drag on exports.

Risks to growth

Weak monsoon

Rainfall over the country during monsoon season (June-September), 2023 was 94% of its long period average (LPA). Deficient rainfall has a significant impact on the rural demand. However, The India Meteorological Department's (IMD's) first stage forecast for the 2024 South-West Monsoon season has indicated above-normal rainfall at 106% +/- 5% of the Long Period Average (LPA), with the expectation of development of La Nina conditions in August-September 2024.

Inflation pressure

Inflation data released in April 2024 showed Consumer Price Index (CPI) inflation eased to a 5-month low of 4.9% in March from 5.1% in February. While core inflation declined to a record low of 3.3%, fuel inflation declined to 3.2% on the back of lower domestic fuel prices. The worry, though, remains on persistently high food inflation, at 8.5%.

External drag on growth

Global growth is likely to slow down this year because of higher interest rates. Central banks in key advanced economies have maintained policy interest rates in their latest meetings. This, coupled with the improving inflation outlook, will allow the RBI to initiate rate cuts in fiscal 2025. Geopolitical tensions like conflict of Gaza and Israel, continued attacks in the Red Sea will continue to disrupt global trade.

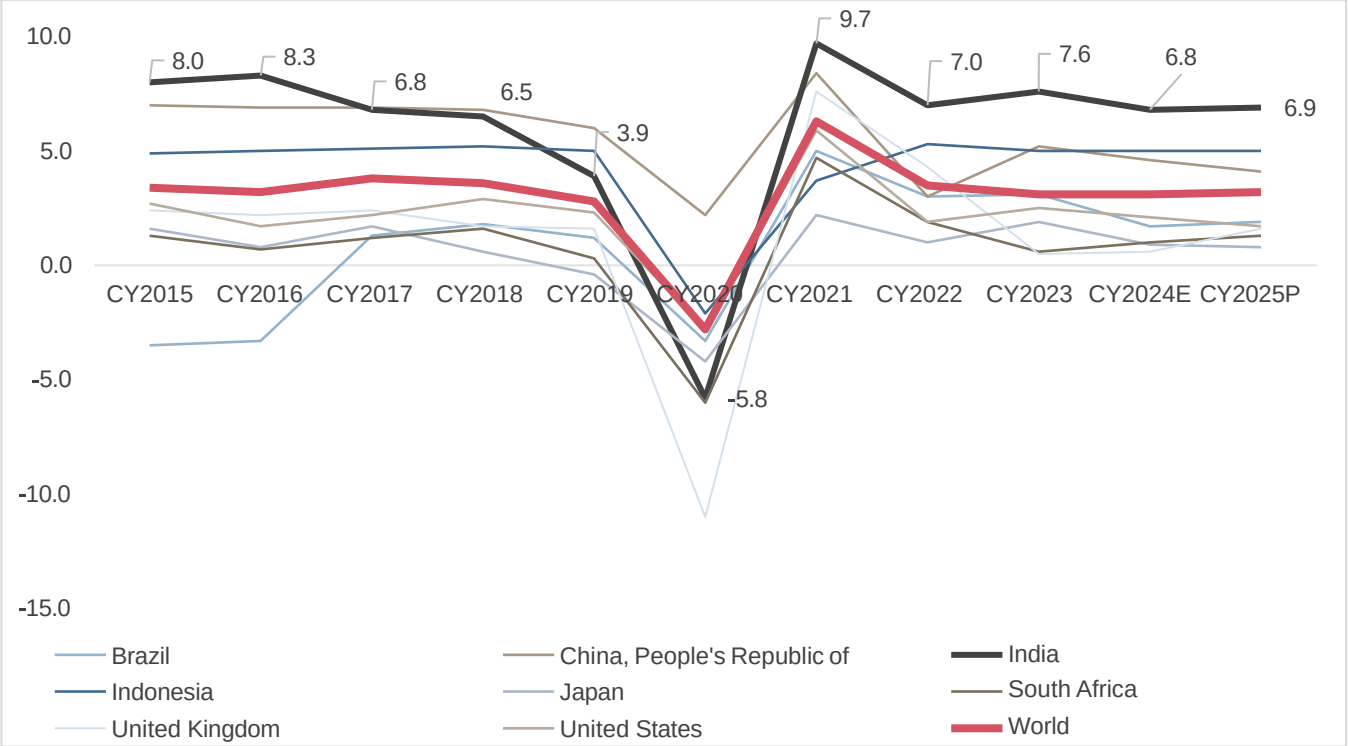
Impact of higher interest rates

The transmission of past rate hikes by the Monetary Policy Committee (MPC) is still playing out amid tight liquidity conditions, which suggests a further rise in market lending rates in the near term. This will moderate domestic demand. The RBI’s move to increase risk weights on the consumer credit exposure of banks and non-banking financial companies (NBFCs) is also expected to mildly affect overall credit growth in fiscal 2025

India to remain a growth outperformer globally

Despite slowdown in the near term, India's growth is expected to outperform over the medium run. CRISIL MI&A expects GDP growth to average 7.0% between fiscals 2025 and 2028, compared with 3.2% globally as estimated by the IMF.

India is one of the fastest growing emerging economies (GDP growth, % year-on-year)



E: estimated; P: projected
Note: GDP growth based on constant prices
Source: IMF (World E conomic Outlook – January 2024 update), CRISIL MI&A

Drivers for India's economic growth:

Capital will continue to be the biggest contributor to growth. As the government pursues fiscal consolidation, its role in boosting overall capex will partly diminish compared with the past few years.

Strong domestic demand is expected to drive India's growth over peers in the medium term.

Investment prospects are optimistic, given the government's capex push, progress of Production-Linked Incentive (PLI) scheme, healthier corporate balance sheets, and a well-capitalised banking sector with low non-performing assets (NPAs).

India is also likely to benefit from its diversification of the supply chain for incoming FDI flows, as global supply chains get reconfigured with focus shifting from efficiency towards resilience and friend shoring.

Rising employment rates and a notable increase in private consumption, buoyed by growing consumer confidence, are poised to drive GDP growth in the upcoming months.

The government's future capital expenditures are expected to be supported by factors such as tax buoyancy, simplified tax structures with lower rates, tariff structure reassessment, and tax filing digitization.

Medium-term growth is anticipated to be bolstered by increased capital spending on infrastructure and asset development projects, leading to enhanced growth multipliers.

Near term review and outlook on inflation

Consumer price inflation (CPI) eased to a 5 months low of 4.9% in March 2024 from 5.1% in February 2024. While core inflation declined to a record low of 3.3%, fuel Inflation declined to 3.2% on the back of lower domestic fuel prices. The food inflation is high, at 8.5%. Higher cereals inflation, erratic vegetable inflation and elevated pulses inflation are a cause of concern given the India Meteorological Department's (IMD) prediction of higher-than-normal temperatures between April and June.

Although headline inflation eased to 5.4% on-year in fiscal 2024 from 6.7%, food inflation surged to 7.5% from an already high 6.6% in fiscal 2023. The March 2024 reading of 8.5% food inflation creates some disquiet given the prediction of higher-than-average temperatures over the next few months that can stress vegetable production and some of the rabi crop that is yet to be harvested. Beyond that, we expect food inflation to ease a tad on the back of the prediction of a favourable monsoon (above normal rains as per the IMD), some benefit from a high food inflation base and an expected season downturn in pulses inflation.

We expect non-food inflation to remain comfortable, supported by softness in consumer demand, a pass-through of the previous year's oil price decline to domestic fuel (petrol and liquefied petroleum gas (LPG)) prices and an expectation of benign crude prices. Under these assumptions, we expect CPI inflation to average 4.5% in FY25. Intensification/persistence of geopolitical concerns and weather shocks, if any, pose an upside risk. Meanwhile, the government's budget is slimmer, which means the fiscal impulse to growth is also leaner and, therefore, less inflationary. All these factors contribute to the favourable conditions for interest rate reductions during this fiscal year, provided that potential hindrances such as food inflation or geopolitical escalations do not intervene and defer this decision.

Food inflation remains high

In March 2024, there was a slight softening in overall vegetable inflation to 28.3% from 30.2% in February 2024. However, specific vegetables like onions and potatoes saw increased inflation, while tomato inflation decreased but remained high. Excluding tomatoes, onions, and potatoes, vegetable inflation decreased to 24.4% in March 2024 from 34% in February 2024, mainly due to cooling inflation in garlic, brinjal, and lady's finger.

Foodgrain inflation inched up to 10.2% in March from 9.8% in February 2024, with cereals inflation rising to 8.4% in March 2024 vs 7.7% in February 2024. Wheat inflation (from non-Public Distribution System (PDS) sources) accelerated to 4.7% in March from 2% in February 2024 partly due to an adverse base. Rice inflation, on the other hand, inched down to 12.7% in March from February's 12.9%.

However, easing pulses inflation to 17.7% in March from 18.9% in February 2024, capped the rise in foodgrains inflation. Among pulses, inflation eased in arhar upto 33.5% in March vs 36.8% in February and moong to 11.5% in March from 12% in February. Inflation in meat and fish accelerated for the second straight month to 6.4% in March from 5.2% in February driven by chicken which increased to 8.5% in March which was 5.6% in February 2024 and fish and prawn to 6.6% in March from 6.1% in February. The pace of deflation in edible oils slowed significantly. Prices declined 11.7% on-year compared with 14% in the February month. Spices inflation moderated for the

seventh straight month to 11.4% in March 2024 from 13.5% in February. Inflation in sugar eased for the first time in over a year to 7.3% in March from 7.5% in February 2024.

Fuel inflation fall further

Fuel prices fell 3.2% year-on-year in March 2024 compared with a 0.8% decline in the previous month, remaining negative for the seventh straight month. LPG prices fell by a sharper 22.3% in March year-on-year compared with a 13.3% decline in February. This was due to the central government cutting prices since March. Inflation remained unchanged in electricity, at 10.4%, for the third consecutive month. Inflation picked up in PDS kerosene to -7.4% in March from -11.2% in February 2024 and Inflation in fire and woodchips increases to 3.2% in March 2024 from February's 3%.

Core inflation eases to a record low

Core inflation inched down to a record low of 3.3% in March 2024 from 3.4% the previous month. Inflation eased in the essential categories of education to 4.7% from 4.8%, in health to 4.3% in March from 4.5% in February, and in housing to 2.8% in March as compared to 2.9% in February. On the other hand, inflation picked up in personal care and effects to 6% in March from 5.2% in February, led by rising gold prices to 12.9% in March as compared to 10.2% in previous month. There was a slight uptick in recreation and amusement inflation to 2.8% in March vs 2.7% in February. Core goods eased to 2% in March from 2.5% in February, while services inflation remained unchanged at 3.3%.

WPI claws up

Wholesale Price Index (WPI)-linked inflation increased to 0.5% in March from 0.2% in February, mainly due to a rise in food inflation. Food inflation rose to 4.6% in March from 4.1% in February, driven by higher prices of cereals (9.0% vs 6.6%), which more than offset the decrease in pulse prices (17.2% vs 18.5%). This resulted in an uptick in foodgrain inflation to 10.5% in March from 8.7% in February. Vegetable inflation remained largely unchanged at 19.5% in March compared to 19.8% in the previous month. Crude oil inflation decreased to 10.3% in March from 16.7% in the previous month. The rate of deflation in fuel and power slowed to -0.8% in March from -1.6% in February, influenced by increasing inflation in electricity (6.4% vs 3.5%), coal (0.5% vs 0.3%), and mineral oils (-3.5% vs -3.8%). Inflation on manufactured products rose to -0.8% in March from -1.3% in the previous month. Furthermore, the pace of deflation eased in basic metals (-5.3% vs -5.7%), chemicals (-4.6% vs -5.2%), and textiles (-1.7% vs -1.9%). Inflation in machinery and equipment remained unchanged at 1.6%.

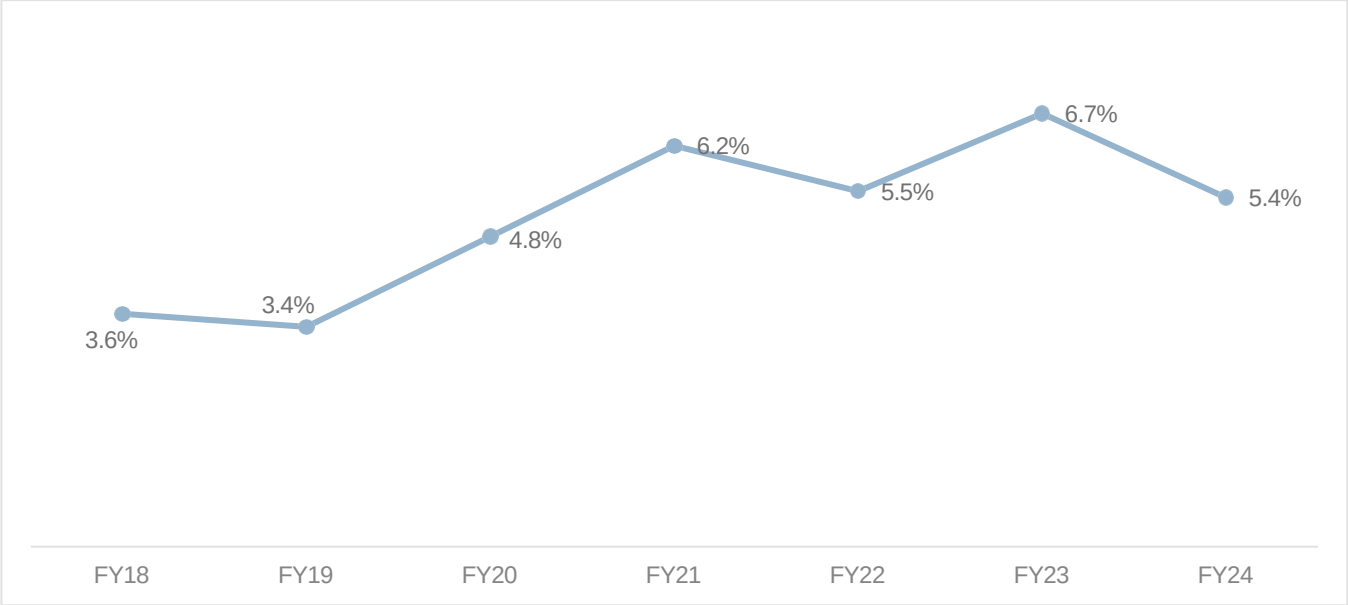
Outlook on inflation

While headline Consumer Price Inflation (CPI) eased to 5.4% year-on-year in fiscal 2024 from 6.7%, food inflation surged to 7.5% from a high of 6.6% in fiscal 2023. The March 2024 reading of 8.5% food inflation raises concerns, particularly with the prediction of higher-than-average temperatures in the coming months, which could strain vegetable production and some yet-to-be-harvested rabi crops. Looking ahead, we anticipate a slight easing in food inflation, driven by favorable monsoon predictions (above-normal rains according to the IMD), some relief from a high base of food inflation, and an expected seasonal decline in pulses inflation.

We anticipate non-food inflation to remain manageable, supported by subdued consumer demand, the impact of previous year's oil price declines on domestic fuel prices (petrol and LPG), and expectations of stable crude prices. Based on these assumptions, we project CPI inflation to average 4.5% this fiscal year. However, intensification or persistence of geopolitical tensions and weather-related shocks pose an upside risk to this forecast. Moreover, with a leaner government budget, the fiscal impulse to growth is diminished, which could alleviate inflationary pressures.

These factors create a conducive environment for potential rate cuts this fiscal year, unless challenges such as food inflation or geopolitical tensions intervene and delay such decisions.

CPI trendline



Source: Ministry of Statistics and Programme Implementation (MOSPI), CRISIL MI&A Research

The MPC noted encouraging signs for food inflation easing on the back of an expected bumper rabi output in the current season and a normal monsoon. However, it will remain vigilant about unpredictable weather events, the frequency of which has increased in recent years. The MPC kept its consumer price index (CPI) inflation forecast unchanged at 4.5% for fiscal 2025.

Factors with a direct bearing on auto demand

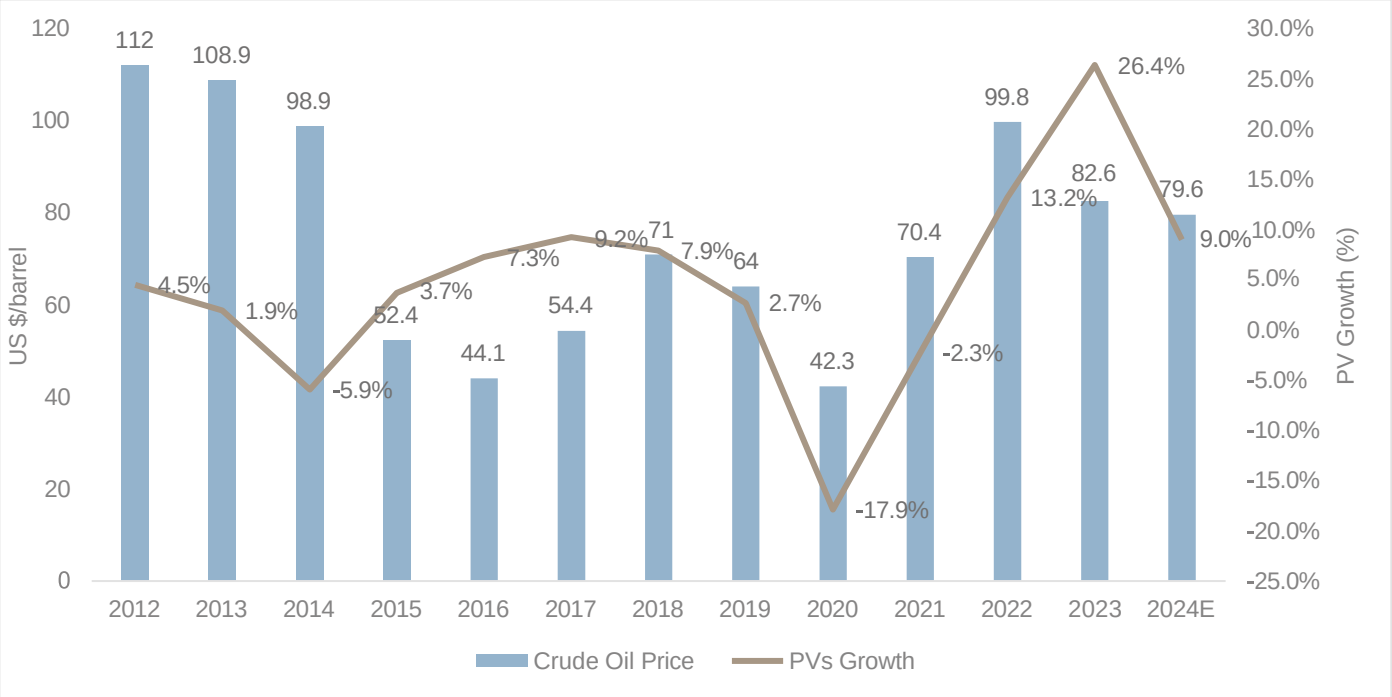
Fluctuations in crude oil prices and INR USD exchange rates directly affect the auto demand by raising fuel costs and import costs. Monsoon has a direct impact on the agriculture related factors like crop yields and food prices, which in turn impact auto demand by shaping consumer spending behaviors and economic stability. Similarly, auto finance rates are pivotal in determining affordability. Moreover, Private Final Consumption Expenditure (PFCE) and per capita income serve as a vital factor in consumer purchasing power, directly influencing affordability and automotive demand.

Elevated recessionary fears to impact crude oil prices

Crude oil prices have generally risen since end of 2021. They became even higher with the Russia-Ukraine conflict, which led to the prices averaging $100 per barrel (bbl) in 2022. The prices averaged $106 per barrel in the first half of 2022 owing to the Russia-Ukraine conflict, which resulted in a significant shift in the overall crude oil supply chain. However, increasing recessionary fears stemming from inflation coupled with interest rate hikes globally have cast a significant shadow over consumption and economic growth, pushing prices downward to $94 per barrel a decline of 11% in the second half of 2022.

In 2023, with the de-escalation of the crisis and balancing of global crude oil trade, the crude oil price was 82.6 $/barrel in the year. With the volatile global crude oil prices, CRISIL MI&A expects prices to remain rangebound around $75-80 per barrel in 2024. However, any decision by the OPEC to cut production, as well as a further decision on the ban of Russian crude, are key factors to be monitored.

Crude oil price and Passenger Vehicle Growth trend



Note: E: Estimated, Price data is for CY: Calendar Year, PVs Growth is for Financial Year and For FY24 the growth rate is based on actual number.

Source: Industry, CRISIL MI&A Research

Global crude oil supply rose by a healthy 4 mbpd, reaching 94 mbpd in 2022. Incremental growth in supply is driven by the US, Saudi Arabia, the United Arab Emirates and Iraq, accounting for ~80% of incremental supply in 2022.

Crude oil supply continued to be impacted in certain regions. Production-led difficulties in Norway, Libya and Nigeria led to a 10% decline in the year. Supply chain and gas leak issues in Kazakhstan resulted in muted output from the region.

Ramping up of newer fields in Norway and increased production in the North American region will aid healthy supply of crude oil. Higher drilling activities coupled with lower logistical issues from the Permian basin and Eagle Ford basin will result in healthy supply growth in the US. However, incremental production cuts by OPEC and Russia continued to impact global crude oil supply in 2023.

Rising crude oil prices typically lead to higher fuel costs. Impacting consumer preferences towards more fuel-effective vehicles. Increased production cost for automakers and potential shift in consumer spending due to inflation and economic conditions further influence automotive demand.

Crude oil has for long held sway in satiating the world's energy needs. However, certain factors will impact the long-term oil demand going forward. Factors such as slowing global GDP, structural changes, aggressive push towards electric vehicles (EVs), significant increase in efficiencies, and an ageing population, which has the propensity to consume less crude oil-based products and services, will likely weaken demand.

INR USD exchange rate for next one year

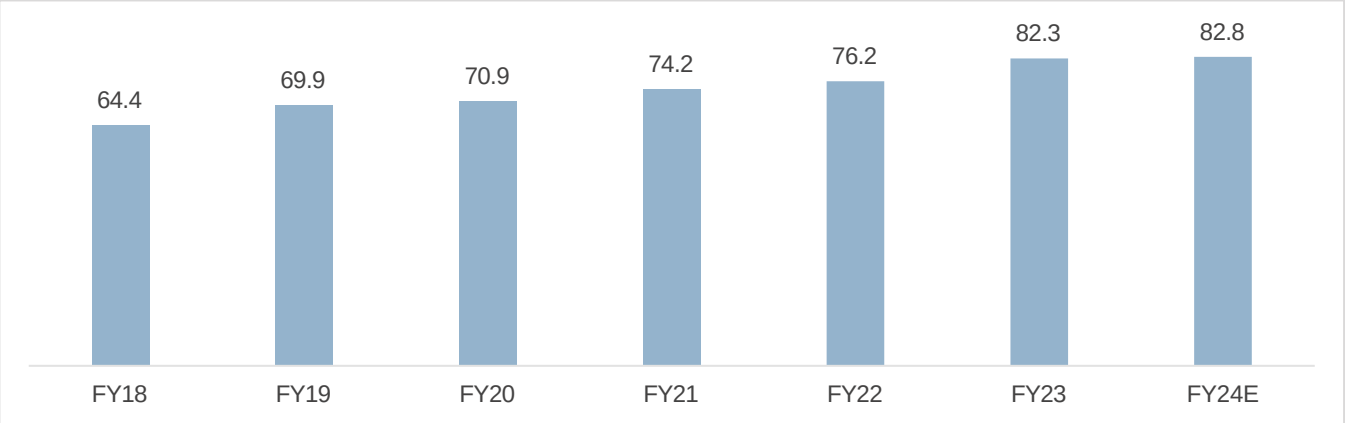
The rupee exchange appreciated slightly to 82.96/$ in February 2024 from 83.12/$ in January 2024. Strong capital inflows kept the rupee resilient in February, despite the dollar index gaining strength and a widening trade deficit. In fact, on a monthly average basis, the rupee appreciated 0.2% compared with January.

The rupee remained one of the better-performing emerging market currencies in the first two months of 2024, appreciating against the dollar by 0.2% on average on-month. The on-year rate of depreciation was also lower at 0.4% on average during January and February.

CRISIL expects the rupee to average to 83.5 against the dollar by March 2025 compared with ~83 in fiscal 2024. While a narrower current account deficit is expected to support the local currency, volatile external financing conditions could exert some pressure.

The INR/USD exchange rate impacts auto demand by affecting import costs. A weaker INR raises input costs and fuel prices, which reduces domestic demand while enhancing export competitiveness. While increase in fuel prices directly impacts the consumer demand, rise in input costs may not always have a direct impact, as OEMs do not always pass these costs to the consumers. Any price increase that is passed on by the OEMs, directly affects the consumer's purchasing decision.

Rupee-dollar exchange rate



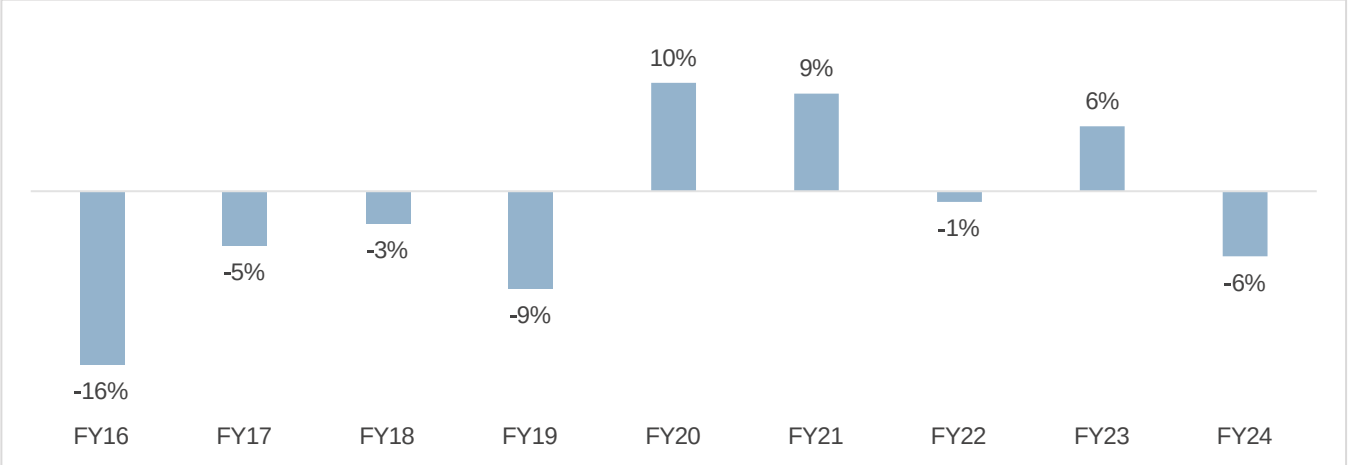
Source: RBI, CRISIL MI&A

Agri Variables

With 86% of land holdings, small and marginal farmers dominate the Indian agricultural landscape. These farmers rely on monsoon for irrigation; hence, its timely arrival and adequacy are needed for a good crop. Any negative impact on crop supply due to low rainfall has a cascading effect on the Indian economy, as it leads to higher food prices and subsequently lower discretionary spending. As per the India Meteorological Department (IMD), monsoon deviation was 6% in fiscal 2023.

Monsoon has been favorable over the past few years with deviation in the acceptable range. Fiscal 2024 witnessed an uneven spread of rainfall during the initial months. Rabi output was favorable last fiscal, supporting farmer income during the early months of fiscal 2024. In the current fiscal, kharif sowing was initially delayed owing to delay in monsoon. However, sowing has picked up in recent months. Moreover, higher minimum support price (MSP) this fiscal and good price in the mandis have maintained on-ground positivity.

Rainfall Deviation Trend

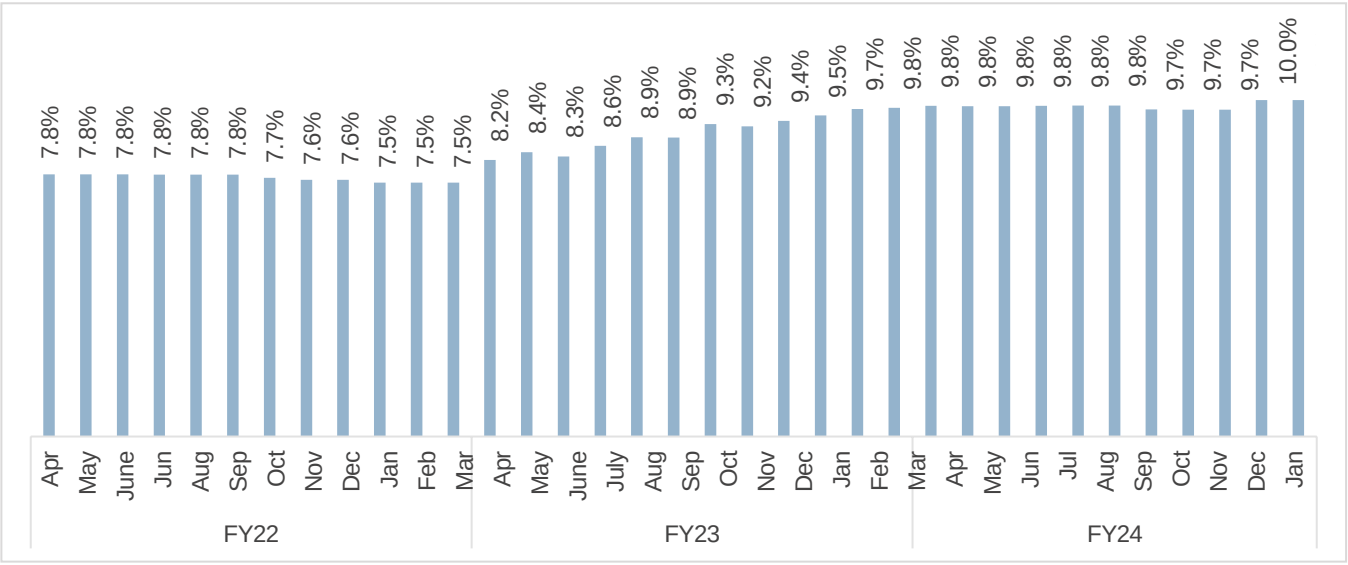


Source: IMD, CRISIL MI&A
Note: When the rainfall averaged over the country is within ±10% from its long period average (LPA) or 90% to 110% of LPA, the rainfall is said to be "normal". The LPA for the June to September period is 868.6mm.

Steep hike in auto finance rates

The sharp rise in repo rates has increased the financing rates across auto segments. The PV segment is currently witnessing interest rates of nearly 10%. Interest rates have reached the pre-pandemic levels and are expected to remain firm in the short term. Demand for cars- durable goods most often purchased on credit and higher interest rates makes auto loans more expensive impacting purchasing decisions of customers.

Average auto finance rates offered by banks



Source: Industry, CRISIL MI&A

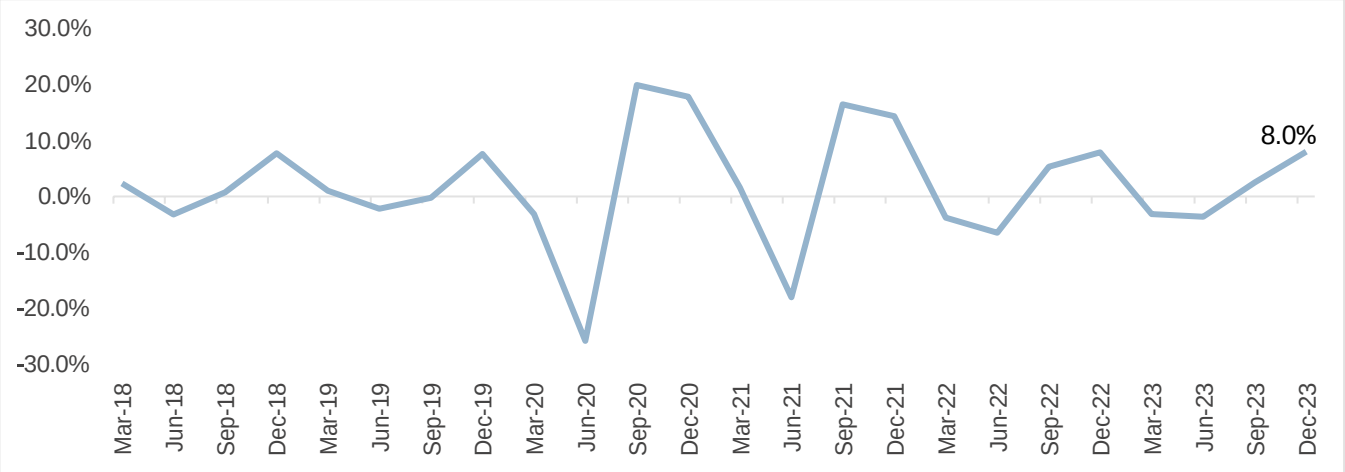
Private consumption remains tepid

Private final consumption expenditure (PFCE) rose marginally to 3.5% on year in third quarter of fiscal 2024 compared with 2.4% the previous quarter, but remains sluggish. Rural demand indicators were a mixed bag, with demand for work under National Rural Employment Guarantee Act (NREGA) slowing this quarter, and growth in

two-wheeler sales surging. However, growth in consumer non-durables production slowed considerably in the third quarter. Urban demand seemed to have sustained some momentum in the third quarter, with a pick-up in the growth of passenger vehicle sales and consumer durables production, as well as continued double-digit growth in retail credit (18.1% versus 18.3% in the previous quarter). The latter indicates that the impact of past rate hikes and regulations on unsecured lending are still pending.

PFCE reflects the overall consumption patterns and spending capacity of households within an economy. When PFCE increases it often translates to increased demand for various goods and services.

PFCE Quarterly Trend for India



Source: Industry, CRISIL MI&A

Per Capita Income

Per capita income (per capita NNI) is estimated to grow by 6.8% in fiscal 2024, compared with 5.7% in fiscal 2023. In fiscal 2021, per capita income declined 8.9% owing to GDP contraction amid the pandemic's impact. Per capita income rose by 7.6% in fiscal 2022 on the lower base of fiscal 2021.

According to the International Monetary Fund's estimates, India's per capita income (at current prices) is expected to grow at 8.8% CAGR over 2023 to 2028.

Higher per capita income in India correlates with increased car demand due to greater affordability and purchasing power. Rising income levels signify economic growth, urbanization and changing lifestyles. As per capita income levels increase, so does the demand for cars in India increases.

As per the data from World Road Statistics 2023- International Road Federation, for FY22 the car per 1000 people in India is 24 and the per capita income is USD 2390. While for China in CY2021 the car per 1000 people is 183 and the per capita is USD 11930.

Policies Impacting Automobile Industry

Electrification in India

Amid rising environmental concerns, electric vehicles (EVs) are gaining traction globally, including in India. The country is one of the signatories to the Paris Agreement under the United Nations Framework Convention on Climate Change. It is also part of the EV30@30 campaign, targeting a 30% volume share for EVs by 2030.

To accelerate EV adoption, the government has been incentivising consumers by extending support via FAME (Faster Adoption and Manufacturing of (Hybrid &) Electric Vehicles in India) subsidy as well as tax cuts. The government announced INR 895 crores for Phase I of FAME in April 2015 and 10,000 crores for Phase II of FAME, which commenced on April 1, 2019. The policy aims to provide a subsidy of INR 10,000 per kWh to two-wheelers for both commercial purposes and personal uses. It also envisions creation of infrastructure for charging of EVs.

These schemes alongside the Production Linked Incentive (PLI) schemes, scrappage policy as well as the Make in India initiative are setting up the roadmap for widespread EV manufacturing and adoption in India.

FAME policy (I & II)

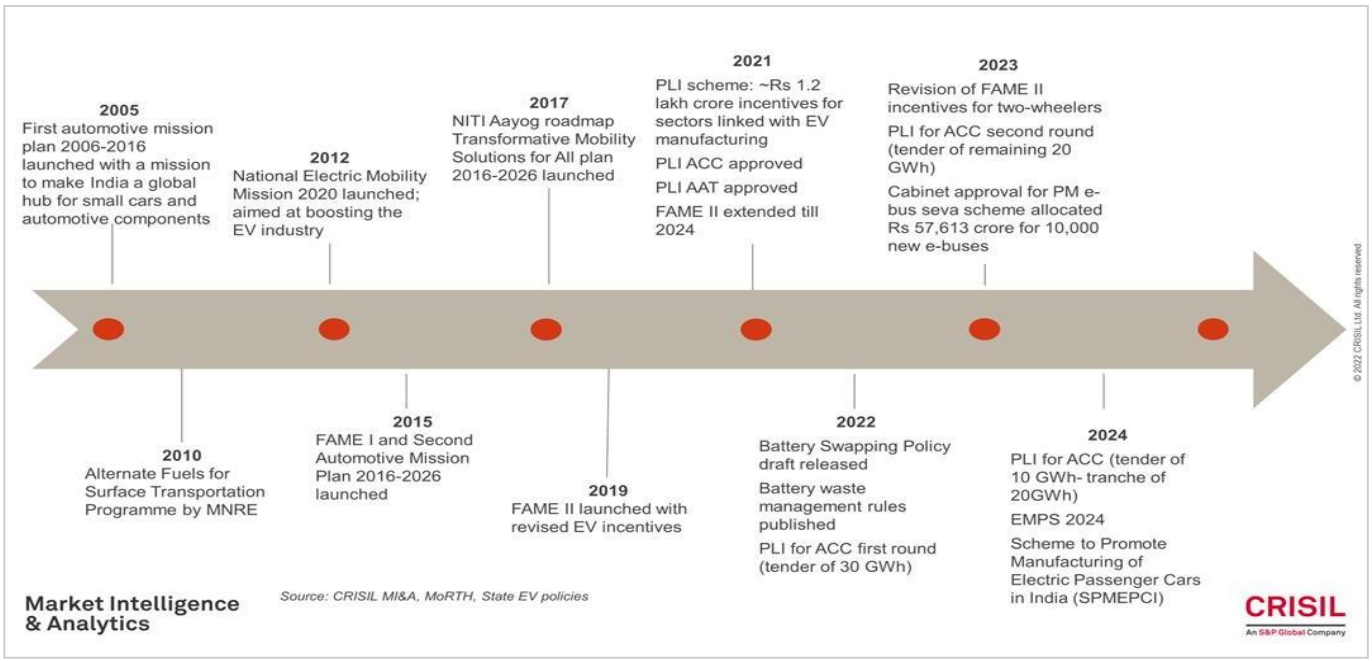
As part of the National Electric Mobility Mission Plan (NEMMP) 2020, the Department of Heavy Industry (DHI) formulated the FAME I policy in 2015 with a budget outlay of INR 895 crore. The FAME I policy was aimed at promoting EV ecosystem through technology development, demand creation, pilot project, and charging infrastructure thereby ensuring its sustainable growth. In the FAME 1, about 2.78 lakh EVs were supported via demand incentives. In addition, 465 buses were sanctioned to various cities/states under this scheme. Phase-II of the FAME policy was implemented with an outlay of INR 10,000 Crore in 2019 for a period of 5 years, with the aim to support demand for EVs by supporting 7,000 e-Buses, 5 lakh e-3 Wheelers, 55,000 e-4 Wheeler (Commercial purposes) and 10 lakh e-2 Wheelers (including commercial & private). The Ministry of Heavy Industries (MHI) had sanctioned 520 Charging Stations/Infrastructure under the FAME I policy. Further, this Ministry has also sanctioned 2,877 Electric Vehicle Charging Stations in 68 cities across 25 States/UTs and 1576 charging stations across 9 Expressways and 16 Highways under FAME II.

Segment	Maximum vehicles supported	Approx size of battery (kWh)	Incentive offered (INR/kWh)	Maximum Ex-factory price to avail incentive (INR)
2W	1,000,000	2	10,000	1.5 lakhs
3W	500,000	5	10,000	5.0 lakhs
4W	35,000	15	10,000	15.0 lakhs
Bus	7,090	250	20,000	2.0 crores

In June 2021, demand incentive for 2Ws was increased to INR 15,000/ kWh capped at 40% of the vehicle cost. In June 2023, this was again revised and reduced to INR 10,000 per kWh of battery from INR15,000 per kWh earlier and the maximum subsidy cap from 40% to 15%.

With the expiry of FAME II in fiscal 2024, the government introduced Electric Mobility Promotion Scheme 2024 (EMPS) to support the adoption of EV 2Ws and 3Ws.

Snapshot of policies supporting EV adoption and support for EV supply chain



The Government of India has introduced a set of fiscal and non-fiscal incentives to support the adoption of electric mobility. In 2012, National Electric Mobility Mission 2020 (NEMMP 2020) was launched with a target of having 6-7 million electric vehicles on the road by 2020. This was further supported with the announcement of the Faster Adoption and Manufacturing of (Hybrid &) Electric Vehicles (FAME) scheme in 2015. The FAME scheme provided subsidies for the purchase of electric vehicles and for the installation of charging infrastructure. Further as a continuation, the FAME II policy was introduced in 2019 to further support the EV ecosystem. Also, the government introduced Production Linked Incentive (PLI) in 2021 and Phased Manufacturing Program (PMP) in 2022 to support the EV supply ecosystem by supporting OEMs, battery manufacturers and suppliers. The PLI scheme for Advanced Chemistry Cell (ACC) (INR 18,100 crore) along with the PLI Scheme for automotive sector (INR 57,042 crore) and FAME II (INR 10,000 crore) will enable India to adopt environmentally cleaner, and sustainable EV based system from the traditional fossil fuel-based automobile transportation system. Further in March 2024, Electric Mobility Promotion Scheme (EMPS) was launched as a short-term policy to support the adoption of E2Ws and E3Ws through demand incentives. This scheme was launched as a replacement scheme for FAME II, however, for a shorter duration and lower incentives compared to FAME II.

Electric Mobility Promotion Scheme 2024

MHI introduced Electric Mobility Promotion Scheme 2024 (EMPS 2024) in March 2024 with a budget outlay of INR 500 crores for a period of 4 months, starting from 1st April 2024 to 31st July 2024, for faster adoption of electric two-wheeler (e-2W) and three-wheeler (e-3W). The scheme is aimed at providing incentives for the purchase of e-2Ws and e-3Ws in the country. The scheme would support the adoption of 372,215 EVs in total, including 333,387 e-2Ws and 38,828 e-3Ws. The targeted e-3Ws include 13,590 e-rickshaws and e-carts, and 25,238 e-3Ws in the L5 category. Under the FAME-II scheme, PMP was implemented, and manufacturers were obligated to follow the PMP guidelines outlining the localization of EV components over time. These PMP guidelines for EVs will have to be followed by OEMs to be eligible for support under Electric Mobility Promotion Scheme 2024.

E-2Ws will get a subsidy of INR 5,000 per kWh with a maximum limit of INR 10,000 per vehicle under the new scheme. E-rickshaws and carts will get a subsidy of Rs 5,000 per kWh with a limit of Rs 25,000 per vehicle. E-3Ws in the L5 category will also get a subsidy of Rs 5,000 per kWh with maximum incentive capped at Rs 50,000 per vehicle. Subsidies plays vital role in driving sales for EVs in the country. With FAME II having expired in March 2024, the introduction of EMPS is expected to provide an impetus to the EV market in the near term.

Clean technology scheme

CleanTech is about developing and deploying new technologies and solutions that can help address the impact of climate change. CleanTech covers how energy is produced, utilize it and how are other natural resources are manage such as water, land and air. Government has already initiated several schemes on development and promotion of clean technology and waste minimisation strategies. Government policies and incentives aimed at promoting clean tech resources and reducing greenhouse gas emissions.

Major schemes and the steps announced in the union budget 2023 aimed at promoting clean energy and sustainable living. In line with the announcement made in the Union budget 2023-24, the ministry of Power has

formulated a scheme on viability Gap funding for development of Battery Energy Storage System with capacity of 4000 MWh.

In the Union Budget 2023-24, customs duty exemption has been extended to import of capital goods and machinery required for manufacture of lithium-ion cells for batteries used in electric vehicles up to 31st March 2024.

Several major steps and schemes announced in the union budget 2023 for the promotion of clean energy.

- Investment of Rs. 20,700 crore including central support of Rs. 8,300 crore for strengthening of interstate transmission system for evacuation and Grid Integration of 13 GW renewable energy from Ladakh.
- Notification of *Green Credit Programme under the Environment (Protection) Act* for encouraging behavioural change
- "*PM Programme for Restoration, Awareness, Nourishment and Amelioration of Mother Earth*" to promote alternative fertilizers and balanced use of chemical fertilizers.
- 500 new 'waste to wealth' plants to be established under the new *GOBARdhan (Galvanizing Organic Bio-Agro Resources Dhan)* scheme with a total investment of Rs 10,000 crore.
- One crore farmers to be facilitated to adopt natural farming over the next 3 years. For this, 10,000 *Bhartiya Prakritik Kheti Bio-Input Resource Centres* to be set-up, creating a national-level distributed micro-fertilizer and pesticide manufacturing network.
- '*Mangrove Initiative for Shoreline Habitats & Tangible Incomes'*, *MISHTI*, for mangrove plantation along the coastline and on salt pan lands, wherever feasible, through convergence between MGNREGS, CAMPA Fund and other sources.
- *Amrit Dharohar*, scheme to encourage optimal use of wetlands, and enhance bio- diversity, carbon stock, eco-tourism opportunities and income generation for local communities.
- Coastal shipping to be promoted as the energy efficient and lower cost mode of transport, both for passengers and freight, through PPP mode with viability gap funding.
- Allocation of adequate funds to scrap old vehicles of the Central Government and support to States in replacing old vehicles and ambulances.

Improving infrastructure raising efficiencies in logistics

The government's capex push has been focused largely on transport-related sectors, such as roads, railways, and urban infrastructure. This is being complemented with policies geared towards improving and integrating different segments of the logistics ecosystem. All these are expected to reduce bottlenecks and improve competitiveness of domestic production and trade via reduced logistics costs and improved connectivity.

National Infrastructure Pipeline:

The government has set targets for infrastructure development between fiscals 2019 and 2025. CRISIL MI&A Consulting expects aggregate (government plus private) spending on infrastructure to double by 2030, i.e. from ~INR 67 trillion between fiscals 2017 and 2023 to ~INR 143 trillion during fiscal 2024 to 2030, primarily driven by

spends on 'core' infrastructure, i.e. roads, railways, airports, ports, urban infrastructure, irrigation, warehouses, and telecom.

PM Gati Shakti

National Master Plan for Multi-modal Connectivity: Gati Shakti Scheme or National Master Plan for multi-modal connectivity plan, was unveiled in October 2021, with an objective of curtailing the logistics cost for the country, by coordinating the infrastructure creation activity different government entities. Major characteristics of the scheme are:

- Digital platform for coordination across 16 ministries, including roadways and railways
- 'Gati Shakti' platform will subsume the infrastructure projects announced under the National Infrastructure Pipeline (valued at INR 111 trillion)
- Existing infrastructure schemes across ministries, such as Bharatmala (Roads), Sagarmala (Ports), UDAN (Air), Inland Waterways, Dry ports etc. will be incorporated in the platform
- The platform will also provide spatial data and implementation status for different projects
- Eleven industrial corridors and two defence corridors are also planned in the scheme, covering clusters for textile, pharmaceutical, fishing, electronics, agriculture etc.

Key targets set for different heads under the scheme are:

- Ports: Capacity of the major ports to be increased from 1,282 million tonnes in fiscal 2020 to 1,759 million tonnes in fiscal 2025
- National Waterways: Cargo movement to be ramped from 74 million tonnes to 95 million tonnes during fiscal 2020-25 period
- Railways: Target of 1,600 million tonnes by fiscal 2025, vis-à-vis 1,210 million tonnes in fiscal 2020
- MMLPs: Indian railways will setup 500 multimodal cargo terminals by fiscal 2025
- Others: Gas pipeline length to be doubled from 17,000 Km to 34,500 Km within the country, incremental renewable capacity of ~150 GW, power line capacity target of ~452,000 circuit Km by fiscal 2025

An integrated platform to monitor the progress of projects and logistics initiatives spanning across different ministries will certainly aid in increasing coordination and planning infrastructure creation and connectivity.

National Logistics Policy (NLP): National Logistics Policy (NLP) was launched in September 2022 to complement PM GatiShakti National Master Plan (NMP). NLP addresses the soft infrastructure and logistics sector development aspect, including process reforms, improvement in logistics services, digitization, human resource development and skilling. The targets of the NLP are to: (i) Reduce cost of logistics in India; (ii) improve the Logistics Performance Index ranking – aim to be among top 25 countries by 2030 (India was ranked 38 out of 139 countries in 2023), and (iii) create data driven decision support mechanism for an efficient logistics ecosystem. A Unified Logistics Integrated Platform has been set up under this, which, as of September 2023, had integrated 34 logistics portals/digital systems across 33 ministries/ departments, and had over 600 industry players registered. Twenty-one states have also notified their own logistics policies, in line with the NLP.

The infrastructure policies would enhance the logistical efficiency there by strengthening the supply chain for automobiles and auto components. These initiatives will further lower the logistical cost and the lead time in components/automobile transit. In the case of raw materials, this allows various stakeholders in the ecosystem to have a clear understanding of raw material availability and necessary logistics for the same. Thus, these policies augment the efficiency in production, and supply.

Decoupling of global supply chains

As traditional supply chains are threatened by large scale global events, rising trend in protectionism and wage inflation, there is a greater need for rethinking supply chain models to remain competitive. In the wake of global disruptions such as Covid, geopolitical crises, environmental disruptions, etc., significant decoupling of supply chains is happening to bring key supply links closer home, particularly the ones situated in China.

To establish collective supply chains that would improve their resilience in the long term, 18 economies, including India, the US and the EU unveiled a roadmap in July 2022 which included steps to counter supply chain dependencies and vulnerabilities. This was done as a part of the ongoing supply chain de-risking strategy of global companies/multinationals, wherein global companies are diversifying their businesses away from their reliance on a single large supplier, to alternative destinations. Beijing's Zero-Covid policy and the resultant disruptions to global supply chains, container shortage and higher lead times have served as an impetus to this strategy.

This reorientation has benefitted other Asian economies in southeast Asia and India. India can take advantage of the same as the enormous quantum of Chinese exports coupled with India's cost advantage in manufacturing, would serve as a highly lucrative opportunity for Indian manufacturers. Realising this opportunity, the government has introduced many reforms and incentive schemes to increase domestic manufacturing and attract global manufacturing firms to India.

Lowering supply chain dependency on China

India including other nations are actively pursuing strategies to reduce supply chain dependency on China in the wake of pandemic and growing geo-political tensions.

This includes diversifying the supply chain by sourcing inputs from various countries with a goal of reducing the risk of over relying on a single country for sourcing and manufacturing. Furthermore, India is also trying to strengthen the domestic manufacturing environment through various policy initiatives. Key strategies adopted by India to diversify the supply chain includes:

Foreign investments: India is attracting multi-national companies those who are actively seeking to diversify their manufacturing bases away from China. Government is aiding these companies in terms of tax benefits and incentive schemes. India have also regulated the FDI to attract investments from various countries across sectors.

Domestic manufacturing: Government is pushing domestic companies to develop products locally and bring certain level of localisation in the products, thereby reduce dependence on China. This involves introduction of initiatives and schemes like Make in India, Atmanirbhar Bharat, China plus one, PMP and PLI.

Trade diversification: India is actively engaging in trade pacts and FTA to diversify their trade partners. Strengthening trade ties with developing and developed economies offers alternatives to souring of goods and technology.

To reduce the dependency on China and prepare for potential future supply chain challenges, 14 nations under the Indo-Pacific Economic Framework (IPEF), including the United States, Japan and India, have reached an agreement aimed at augmenting supply chain resilience and diversification. The agreement involves sharing information with each other and coordinating responses during the time of crises. Under the agreement, the participating countries would establish an IPEF supply chain council, supply chain crisis response network, and labour rights advisory network that will provide a framework to strengthen supply chains and prevent potential disruptions.

China plus one trend

The China Plus One Strategy, also known as Plus One or C+1, is a supply chain strategy that encourages companies to minimize their supply chain dependency on China by diversifying the countries they source parts from. The goal here is to reduce the risk of over relying on a single country for sourcing and manufacturing.

Many Western countries, including the US, have heavily relied on China when it comes to outsourcing their manufacturing. Low labour and production costs are one of the major reasons for this, as well as factors like China's strong domestic market, supply chain, infrastructure, free trade and tax agreements, and high growth potential. Regardless of the reasoning behind this reliance, people noticed that the global dependency on China was becoming a risk in as early as 2008, with the official China Plus One strategy being first introduced in 2013. This new strategy would allow businesses to continue to invest in China, while spreading their operations across multiple countries, which are considered the "Plus One". By establishing additional sourcing and manufacturing locations outside of China, companies found a way to mitigate business risks, access new consumer markets, and explore other innovation and technology, all while keeping their operations cost-effective.

Today, geopolitical, and economic factors drive much of the urgency behind businesses implementing a China Plus One approach. The approach gained traction due to the US–China trade war, fuelled by U.S. President Donald Trump in 2018. As tensions escalated throughout Trump's presidency, businesses became uncertain about how their supply chain and operations would be affected, accelerating the adoption of China Plus One. Additionally, the COVID-19 pandemic exposed vulnerabilities in global supply chains, especially for those who relied on China alone. Companies with diversified supply chains were better equipped to navigate disruptions caused by China's "Zero-Covid" policy, which lead to long lockdowns and factory closures. Other issues, such as rising labour costs in China and various Chinese political movements, have also contributed to the rise of China Plus One in recent years.

Make in India

The 'Make in India' initiative was launched in September 2014 to give a push to manufacturing in India and encourage FDI in manufacturing and services. The objective of the initiative was to increase the share of manufacturing in GDP to 25% by 2020 by boosting investment, fostering innovation, and intellectual property. The other objective was building best-in-class infrastructure for manufacturing across sectors, including, but not limited to automobile, auto components, aviation, biotechnology, chemicals, construction, defence manufacturing, electrical machinery, electronic systems, food processing, mining, oil and gas, pharmaceuticals, renewable energy, thermal power, hospitality, and wellness.

To achieve this objective, a dedicated Investor Facilitation Cell was set up to assist investors in seeking regulatory approvals, hand-holding services through the pre-investment phase, execution, and after-care support. Key facts and figures, policies and initiatives and relevant contact details were made available through print and online media. Indian embassies and consulates proactively disseminated information on the potential for investment in the identified sectors in foreign countries while domestically, regulations and policies were modified to make it easier to invest in India.

FDI inflows have received an impetus, as India jumped to the eighth position in the list of the worlds' largest FDI recipients in 2020 compared with 12th in 2018, according to the World Investment Report 2022. FDI to India almost doubled to USD83.6 billion in fiscal 2022 from USD45.15 billion in fiscal 2015. However, during fiscal 2023, FDI inflow decreased to USD71 billion (provisional figure). According to Ministry of Commerce & Industry, FDI inflow in the last 9 fiscal years (2014-23: USD596 billion) has increased by 100% over the previous 9 fiscal years (2005-14: USD298 billion) and is nearly 65% of the total FDI reported in the last 23 years (USD 920 billion).

However, the share of manufacturing in GDP has not attained the intended levels of 25%. Hence, additional policies were announced, and targets rolled forward initially to 2022 and then to 2025. Domestically, multiple steps were taken to make sectors more attractive and ease investment processes. Some of the major steps taken included announcement of the NIP and reduction in corporate tax; various sectors such as defence manufacturing, railways, space, and single brand retail have been opened for FDI. Measures to boost domestic manufacturing were also taken through Public Procurement Orders (PPO), Phased Manufacturing Programme (PMP) and Production Linked Incentive (PLI) schemes, etc. Many states also launched their own initiatives on similar lines to boost manufacturing in their respective states.

Foreign Direct Investment (FDI)

FDI plays a pivotal role in economic growth, aiding development and shaping of the economic landscape. Through FDI route, international corporations can invest in India, capitalizing on the country's investment incentives offered by Indian government, including tax incentives and relatively competitive labour costs. This fosters job creation and offers various additional advantages along with facilitating the acquisition of technological expertise from global peers. Government bodies, such as Department for Promotion of Industry and Internal Trade (DPIIT), Reserve Bank of India (RBI) and Securities and Exchange Board of India (SEBI) formulates the regulations, and guidelines for FDI. DPIIT frames and implements policies to promote and regulate foreign investment in India across sectors. RBI manages the monetary aspects of foreign investments and SEBI regulates FDI in the capital market.

There are two FDI routes in India, the Government route and the Automatic route. The Automatic route allows foreign investors to invest in sectors without requiring prior approval from Indian government. Under this route, investors are only required to notify the RBI within a specified time frame. Whereas the Government route mandates prior approval from the Indian government or relevant authorities for investments in India. In April 2020, the DPIIT amended the FDI Policy, that the countries which shares a land border with India which include China, Bangladesh, Pakistan, Bhutan, Nepal, Myanmar, and Afghanistan, can invest only under the Government route. Shortly, it will be mandatory to obtain government approval for investments from these countries. FDI proposals from these countries must go through tight scrutiny and government has set up an inter-ministerial panel to review these proposals. All ministries and departments have been recommended to have dedicated FDI cells to process these proposals quickly. This policy thus restricted entry and expansion of Chinese OEMs including MG and Great Wall Motors in India by restricting them to invest or raise funds from China.

Summary of FDI in key Indian sectors

Sector	FDI Cap	Route
Automobile	100%	Automatic
Airports -Greenfield projects	100%	Automatic
Satellites- establishment and operation, subject to the guidelines of Department of Space/ISRO	74%	Government
Hospitals Sector	100%	Automatic
Defence	49% +	Government up to 100% of local defence ventures after obtaining approval

Source: DPIIT, CRISIL MI&A Consulting

Atmanirbhar Bharat Campaign

Atmanirbhar Bharat Abhiyan or the self-reliant India campaign was launched in May 2020 amid the Covid-19 pandemic, with a special and comprehensive economic package of INR 20 trillion, equivalent to 10% of the country's GDP.

The scheme was launched with the primary intent of fighting the pandemic and making the country self-reliant based on five pillars: economy, infrastructure, technology-driven system, demography, and demand. The stimulus package announced by the government under the scheme consisted of five tranches, intended to boost businesses, including Micro, Small and Medium Enterprises (MSMEs), help the poor (including farmers), boost agriculture, expand the horizons of industrial growth, and bring in governance reforms in the business, health, and education sectors.

The mission emphasises the importance of encouraging local products and aims to reduce import dependence through substitution. It also aims to enhance compliance and quality requirements to meet international standards and gain global market share.

The government has also rolled out other reforms — namely, supply chain reforms for agriculture, rational tax systems, simple and clear laws, capable human resources, and a strong financial system. These reforms will further promote business, attract investment, and strengthen Make in India initiative.

PLI scheme provides boost to industrial investments in the short-to-medium term

The PLI scheme's primary objective is to make manufacturing in India globally competitive by removing sectoral obstacles, creating economies of scale and ensuring efficiency. It is designed to create a complete component ecosystem in India and make the country an integral part of the global supply chain. Furthermore, the government hopes to reduce India's dependence on raw material imported from China. The scheme is expected to boost economic growth over the medium term and create more employment opportunities, as many of the sectors covered under the scheme are labour-intensive. It will be implemented over fiscals 2022 to 2029.

The PLI scheme is a time-bound incentive scheme by the government which rewards companies in the 5-15% range of their annual revenue based on the companies meeting pre-decided targets for incremental production and/or exports and capex over a base year. The stronger-than-expected pick-up in demand and larger companies gaining share over smaller companies led to revival of capex in fiscal 2022. The rise in fiscal 2024 was on account of the expansion plans underway by India Inc.

Construction spends across industrial investments are seen rising 6-8% in fiscal 2024, driven by expansion in the oil and gas and metals segments. The growth is on a low base of fiscal 2023 where the sector faced a slight bump owing to geopolitical issues in the previous two fiscals. However, the PLI scheme is expected to provide the necessary boost to the sector.

Based on an analysis of eight key sectors, CRISIL MI&A Consulting estimates construction investment in the industrial segment at INR 4.0-4.1 lakh crore between fiscals 2023 and 2027, rising 1.3 times over spends seen between fiscals 2018 and 2022. The rise in investments is projected on account of inclusion of the PLI scheme in the capex investments of the industrial sector.

Budgeted incentives for each sector under the PLI scheme

Sector	Segment	Budgeted (INR bn) *	
Automobile	Advance chemistry cell (ACC) battery	181.0	751.4
	Automobiles and auto components	570.4	
Electronics	Mobile manufacturing and specified electronic components	409.5	545.15
	Electronic/technology products/IT hardware	73.25	
	White goods (ACE and LED)	62.4	
Pharma and medical equipment	Critical key starting materials/drug intermediaries and active pharmaceutical ingredients	69.4	253.6

Sector	Segment	Budgeted (INR bn) *	
	Manufacturing of medical devices	34.2	
	Pharmaceutical drugs	150.0	
Telecom	Telecom and networking products	122.0	122.0
Food	Food products	109.0	109.0
Textile	Textile products: man-made fibre (MMF) and technical textiles	106.8	106.8
Steel	Speciality steel	63.2	63.2
Energy	High-efficiency solar PV modules	240.0	240
Aviation	Drones and drone components	1.2	1.2
Total			**2,192**

**Note: Approved financial outlay over a five-year period*

ACE: Appliance and consumer electronics; LED: Light-emitting diode

Source: Government websites, CRISIL MI&A Consulting

An outlay of union budget of INR 751.4 billion for automobiles, auto components and ACC:

INR 570.4 billion allotted for enhancing India's manufacturing capabilities or automobile and auto component industry - Advanced Automotive Products (AAT). The scheme has two components viz. Champion OEM Incentive Scheme and Component Champion Incentive Scheme. A total of 95 applicants have been approved under this PLI scheme.

INR 181 billion under the 'National Programme on Advanced Chemistry Cell (ACC) Battery Storage' for achieving manufacturing capacity of 50 Giga Watt Hour (GWh) of ACC. Four companies have been selected till date for incentive under the PLI Scheme for ACC battery storage.

PLI scheme for the automotive industry: The PLI scheme for the automotive industry intends to promote high-tech green manufacturing, ATT vehicles such as electric and hydrogen fuel cell vehicles. This scheme excludes conventional petrol, diesel, and CNG segments (internal combustion engines), as they have sufficient capacities in India In the auto components category, more than 100 ATT components including hydrogen fuel cells, hydrogen injection systems, EV motors and lightweight cryogenic cylinders are eligible for PLI.

The PLI scheme targeting auto parts includes the following component schemes:

Champion Original Equipment Manufacturers (OEM) Scheme: It is a sales value-linked plan, applicable to battery electric and hydrogen fuel cell vehicles of all segments.

Component Champion Incentive Scheme: It is a sales value-linked plan for advanced technology components, complete- and semi-knocked down (CKD/SKD) kits, vehicle aggregates of two-wheelers, three-wheelers, passenger vehicles, commercial vehicles, and tractors, including automobiles meant for military use and any other advanced automotive technology components prescribed by the Ministry of Heavy Industries – depending upon technical developments.

PLI scheme for the Automotive and Advanced Chemistry cells (ACC): The policy on Advanced Chemistry Cell (ACC) Battery Storage was approved by the Government of India on May 2021 with budgetary outlay of INR 18,100 crores for setting up manufacturing facilities with a total manufacturing capacity of 50 Giga Watt Hour (GWh). This policy will strengthen the ecosystem for electric vehicles and Battery Storage in the country. The policy aims to enhance India's manufacturing capabilities of ACC by setting up of Giga scale ACC battery manufacturing facilities in India with emphasis on maximum domestic value addition.

GST structure for the industry

The two taxes charged to the end consumer on cars and bikes previously were excise and VAT, with an average combined rate of 26.50% to 44% which is higher than the GST rates of 18% and 28%. Therefore, there has been less burden of tax on the end consumer under GST since 2017. Importers/dealers can cheer as they would be able to claim the GST paid on goods imported/sold whereas previously, they were ineligible to claim the excise duty and VAT paid.

Excise paid on stock transfer would be covered by IGST under the GST law. Advance received for supply of goods is also taxed under GST. GST helps the manufacturers in procuring auto parts at a cheaper cost due to an improved supply chain mechanism under GST. GST on cars and bikes is kept under the 28% bracket and a list of cesses to be levied on different kinds of automobiles has also been declared by the Indian government which is ranging from 1 to 22%.

GST and cess rate on automobiles based on fuel type

Category of Car Model	GST Rate	Compensation Cess (%)
Electric Vehicles	5%	Nill
Hydrogen Fuel Cell Vehicles	12%	Nill
Passenger Vehicles (Petrol, CNG, LPG) up to 4m in length and up to 1200 cc engine	28%	1%
Passenger Vehicles (Diesel) up to 4m in length and up to 1500 cc engine	28%	3%
Passenger Vehicles (up to 1500 cc engine)	28%	17%
Passenger Vehicles (Above 1500 cc engine)	28%	20%
Passenger Vehicles popularly known as SUVs (above 4m in length, above >1500 cc engine & >170 mm ground clearance)	28%	22%
Hybrid Passenger Vehicles (up to 4m and up to 1200 cc engine Petrol) or (up to 4m and up to 1500 cc engine Diesel)	28%	Nill
Hybrid Passenger Vehicles (Above 4m or above 1200 cc engine Petrol or above 1500 cc engine Diesel)	28%	15%

Source: SIAM, CRISIL MI&A Consulting

Import duty on cars

Import duty also known as import tax, import tariff or customs duty is an indirect tax levied by Indian authorities on goods purchased from a foreign country. Through import taxes, the price of imported goods increases and demand decreases. This propels domestic market growth, demand for indigenous products and protects Indian OEMs from foreign competitors.

Customs duty on automobiles based on fuel type

Criteria	Engine capacity	Fuel type	Import duty in %
Used car import	Any	Any	125
Cars CBUs whose CIF value is more than USD 40,000	>3000 cc	Petrol	100

	>2500 cc	Diesel	
Cars CBUs whose CIF value is less than USD 40,000	<3000 cc	Petrol	70
	<2500 cc	Diesel	
ICE vehicle SKD:- CKD containing engine or gearbox or transmission mechanism in pre-assembled form but not mounted on a chassis or a body assembly	Any	Any	35
ICE vehicle CKD:- CKD containing engine, gearbox, and transmission mechanism not in a pre-assembled condition	Any	Any	15
Electric Vehicles SKD - Pre-assembled battery pack, motor, motor controller, charger, power control unit, energy monitor contractor, brake system, electric compressor not mounted on chassis	NA	Electric	30%
Electric Vehicle CKD - Disassembled battery pack, motor, motor controller, charger, power control unit, energy monitor contractor, brake system, electric compressor not mounted on chassis	NA	Electric	15%

Note: CIF: Cost, Insurance and Freight, CBU: Completely Built Up, SKD: Semi Knocked Down, CKD: Completely Knocked Down
Source: SIAM, CRISIL MI&A Consulting

The government recently launched a scheme to promote electric passenger cars in India under which import duty concession is offered for OEMs who set up domestic manufacturing facility in India with a minimum investment of USD500 million. Under this scheme, the imported vehicles would attract a reduced customs duty of 15% with maximum CIF (Cost, Insurance & Freight) value of USD35,000.

Corporate Average Fuel Efficiency/Economy norms (CAFE)

CAFE, or Corporate Average Fuel Economy norms aim to reduce fuel consumption by vehicles (or improve fuel efficiency) by lowering carbon dioxide (CO_2) emissions, hence reducing reliance on oil, and regulating pollution. Implemented in India on April 1, 2017, CAFE norms apply to petrol, diesel, LPG and CNG fuelled vehicles. In phase 1 (2017-2022), CAFE norms required average corporate CO_2 emissions to be less than 130 g/km by fiscal 2022 and below 113 g/km thereafter (CAFE II), i.e. vehicles needed to be 10% more fuel-efficient by fiscal 2022. CAFE II norms came into effect on April 1, 2023. This is expected to incentivize the shift towards greener technologies such as hybrids and electric vehicles (EVs). The Energy Conservation Bill requires carmakers to pay INR 25,000 per unit if their fleet's CO2 emissions exceed the intended CAFE score of 0-4.7 g/km, and INR 50,000 per unit if they exceed by more than 4.7g/km.

National Green Hydrogen Mission

The National Green Hydrogen Mission is a comprehensive action plan for establishing a Green Hydrogen ecosystem in India. The policy is aimed at making India a leading producer and supplier of Green Hydrogen in the world thereby creating export opportunities for Green Hydrogen and its derivatives. The policy, which promotes hydrogen as a clean energy source, was approved by the government of India with an outlay of INR. 19,700 crores in January 2023. Of this INR 17,490 crore is allotted for the Strategic Interventions for Green Hydrogen Transition (SIGHT) programme, INR.1,466 crore for pilot projects, INR.400 crore for R&D, and INR. 388 crores towards other Mission components. Under the SIGHT program, the government would offer incentives for manufacturing of electrolysers and production of green hydrogen. By 2030, the government wants to increase its annual hydrogen production capacity to five million metric tonnes. Reducing India's dependence on fossil fuels imports, lowering greenhouse gas emissions, transitioning the economy to low carbon intensity and make the country assume technology and market leadership in this new industry is the aim of the National Hydrogen Mission. The

government plans to achieve this by setting up green hydrogen plants and encouraging research and development in the sector. The government has also invested INR. 35,000 crores in the energy transition to attain the goal of net zero carbon emissions by 2070.

As a part of this mission, development of hydrogen highways suited for heavy-duty, long-haul vehicles could be expected in the future. To strengthen the transport sector, necessary hydrogen production projects, distribution infrastructure and refuelling stations will be built along the highways. This will enable the development of hydrogen fuelled inter-state buses and commercial vehicles on such routes. Furthermore, in February 2024, the government issued Scheme Guidelines for Pilot Projects on use of Green Hydrogen in the Transport Sector that will support pilot projects in buses, trucks and four-wheelers with green hydrogen as a fuel. The scheme will be implemented with a total budgetary outlay of INR. 496 crores till the fiscal 2026 and will support development of technologies based on fuel cell (FCEV) / internal combustion engine (ICE) based propulsion technology. The scheme would also explore the possibility of blending Green Hydrogen based Methanol/Ethanol and other synthetic fuels derived from Green Hydrogen in automobile fuels.

PLI for Green Hydrogen under SIGHT program

SIGHT is a financial incentive mechanism to support domestic manufacturing of electrolysers and green hydrogen. Incentive scheme for electrolyser manufacturing was introduced with an outlay of INR 4,440 crores aimed at maximizing indigenous electrolysers manufacturing capacity, achieving levelized cost of hydrogen production and enhancing domestic value addition. The scheme would incentivise manufacturing of electrolysers in India and the scheme would progressively indigenize the value chain. Incentive scheme for Green Hydrogen production was introduced in June 2023 with an initial outlay of INR 13,050 crores aimed at maximizing the production and enhance cost competitiveness of green hydrogen. The scheme offers support in terms of INR/kg of green H_2 production for a period of 3 years from the date of commencement of production. The incentives will be capped at INR 50/kg for first year, INR 40/kg for second year and INR 30/kg for third year. The cost incentivisation along with the indigenous development of electrolyser technology would support the demand growth and technology development in the transport sector as well.

Ethanol blending in India

The government is promoting the use of ethanol a renewable and environment-friendly fuel in petrol. The Ethanol Blending program is aimed at reducing the import dependence of fuels, savings in foreign exchange, providing boost to domestic agriculture sector and for associated environmental benefits. The Roadmap for Ethanol Blending in India 2020-25 lays out an annual plan to increase domestic ethanol production in line with target of National Policy on Biofuels (2018) to reach a blending of 20% of ethanol in petrol (E20) by 2025/26. The roadmap aims at phased rollout of ethanol blended fuels in India with E10 fuel by April 2022, and phased rollout of E20 from April 2023 to April 2025. Further the policy mandates the roll out of vehicles that are E20 material-compliant and E10 engine-tuned vehicles from April 2023. Further, it mandates the production of E20-tuned engine vehicles from April 2025. OMCs have already rolled out E20 fuel in a phased manner in April 2023, however, they are yet to achieve widespread availability. The government is ambitious of attaining 20% ethanol-blended petrol by 2024-25 and 30% by 2029-30.

BS-IV to BS-VI transition

BS emission standards are issued by the government to regulate the output of air pollutants from motor vehicles. In IJanuary 2016, the government decided to skip BS-V and instead implement BS-VI norms directly from BS-IV. It fixed the deadline of April 1, 2020, for the introduction of BS-VI emission norms.

BS-VI regulations demand major reduction in PM and NOx levels.

Type of Vehicle	Unit	BS IV	BS VI	Change
Diesel				
HC	gm/km	0.3	0.17	**-43%**
NOx	gm/km	0.25	0.08	**-68%**
PM	gm/km	0.025	0.0045	**-82%**
Petrol				
NOx	gm/km	0.08	0.06	**-25%**
PM	gm/km	-	0.0045	**Newly added**

Source: CRISIL MI&A Consulting

Prices of BS-VI-compliant PVs increased 2-4% as devices and systems were added to reduce emission levels. The price hike was higher for diesel vehicles as these require additional exhaust parts.

Addition of devices and sub-systems in BS-VI-compliant vehicles

Pollutant	Devices / Subsystems to be included to reduce the Pollutants
NOX- Nitrous oxide	▪Exhaust Gas Recirculation ▪Selective Catalytic Reduction ▪3 way catalyst ▪Lean NOx Trap
HC- Hydrocarbons	▪Secondary Air Injection ▪3 way catalyst ▪Diesel Oxidation Catalyst ▪Purge Control Valve ▪Canister
PM- Particulate matter	▪Diesel Particulate Filter ▪Gasoline Particulate Filter

Source: CRISIL MI&A Consulting

In November 2022, the European Commission presented a draft proposal on Euro 7 Emission Norm to the European Parliament. According to the same, Euro 7 pollution standards for new cars and vans will be implemented from July 2025 and for buses and lorries from 2027. India follows the matured European market for framing and implementation of policies and adapts it to suit Indian conditions. Provided Euro 7 comes into force from 2025, India is highly likely to propose BS-VII regulation by end of this decade.

2. Review and outlook on the Indian two-wheeler industry

Review of the Indian Domestic Two-wheeler Industry (fiscals 2019 to 2024)

India is the largest motorised two-wheeler markets in the world, with domestic sales of 18.4 million units in fiscal 2024. Two-wheeler sales constituted 73% of the total auto market comprising two-wheeler, three-wheelers, passenger vehicles (PVs), commercial vehicles (CVs) and tractors by volume in fiscal 2024.The passenger vehicle segment contributed around 17% to the Indian auto industry while CVs contributed about 4% and three wheelers and tractors contributed 3% each.

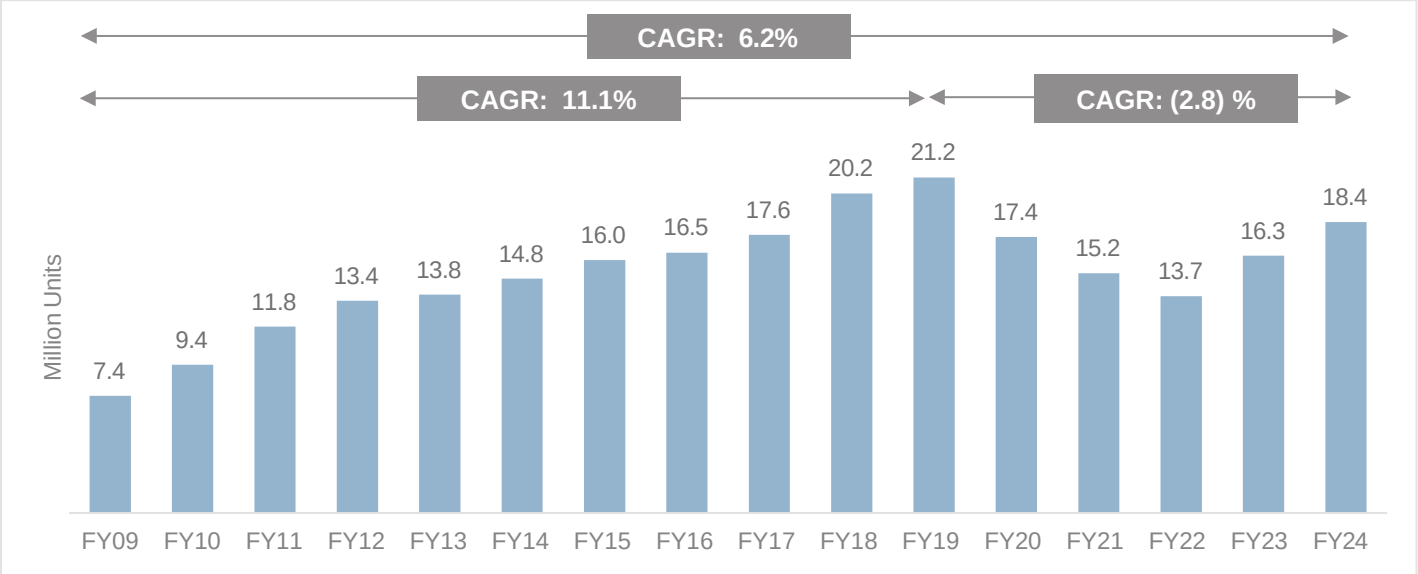
The two-wheeler segment sees a healthy demand in India and is preferred over four wheelers by the majority of the Indian population especially for their regular commute. This is primarily due to the lower acquisition cost, higher mileage, lower maintenance costs, ease of navigation especially during the traffic hours, hassle free parking and suitability on rugged roads of two-wheelers.

In the last 15 years, domestic two-wheeler industry has grown at a CAGR of 6.2% and reached a volume of 18.4 million in fiscal 2024. In fact, until fiscal 2019, the industry has accelerated at a much faster pace of 11.1% CAGR and reached a historic high of volumes of 21.2 million.

During fiscal 2009 to fiscal 2019, India's GDP as well as private final consumption expenditure grew at a healthy pace of 7% CAGR. Moreover, inflation levels were on a tapering trend reaching ~3% levels in fiscal 2019. This favourable macro-economic environment led to a rise in disposable incomes and provided a thrust to the industry growth during the decade. Additionally, the expansion in vehicle portfolio by OEMs, accelerated growth in scooters segment and a healthy growth of premium motorcycles (=>125 cc) subsegment provided additional support to the industry growth during the decade. Moreover, vehicle prices rose at a nominal level of 3-5% during the period limiting the rise in acquisition costs for the customers.

These favorable factors helped the two-wheeler industry reach a historic high of 21.2 million volumes in fiscal 2019. These record sales were despite the higher-than-normal price rise (due to BSIV implementation (fiscal 2018)) as well as GST implementation (fiscal 2018) and demonetization (fiscal 2019) that limited growth of the industry.

Domestic two wheeler sales volume trend – fiscal 2009 to fiscal 2024

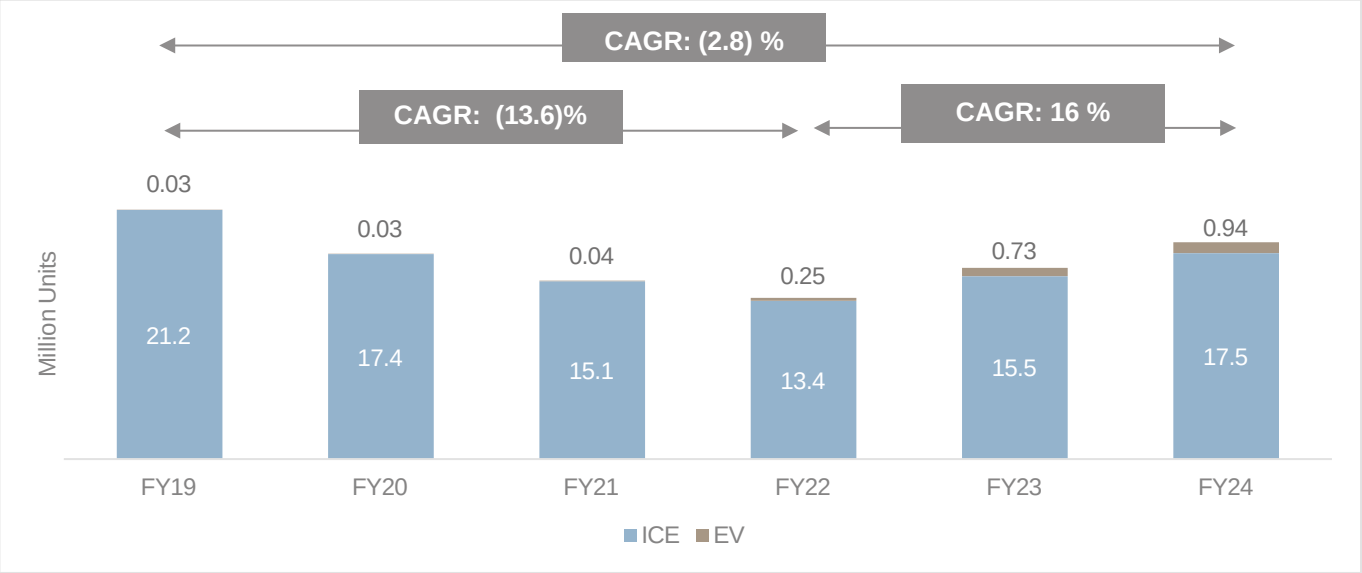


Note: Figures in bracket to be read as negative (Eg. (10) to be read as minus 10)

Source: SIAM, VAHAN, CRISIL MI&A

However, in the next 4 years, fiscal 2019- fiscal 2022, the industry witnessed contraction at 13.6% CAGR amidst the pandemic, nationwide lockdowns, reduced mobility, unfavourable microeconomic scenario, closure of schools, colleges and offices, and work from home impacting the demand for two wheelers.

Domestic two wheeler sales volume trend – fiscals 2019 to fiscals 2024



Note: Figures in bracket to be read as negative (Eg. (10) to be read as minus 10), Data for ICE and EVs; EV retail data from VAHAN has been considered.
Source: SIAM, VAHAN, CRISIL MI&A

y-o-y growth	FY19	FY20	FY21	FY22	FY23	FY24	FY19-24 CAGR
ICE	4.9%	-17.8%	-13.2%	-11.1%	15.5%	12.7%	-3.7%
EV	1393.6%	-4.1%	67.0%	464.1%	187.9%	28.5%	101.7%

Source: SIAM, VAHAN, CRISIL MI&A

On the reduced base of fiscal 2022, two-wheeler sales rebounded in fiscal 2023 and recorded a healthy growth of 19%, driven by improving demand sentiments and the normalization of economic activities and increased mobility. The pent-up demand, because of the postponement done during the pandemic period and sharp rise in scooters demand with restarting of colleges and offices provided thrust to the industry demand. Despite normalisation of public transport, improved frequency of intracity bus and railway services; the demand for the last mile mobility and in turn the demand for two wheelers remained buoyant during the year.

Over and above this, the EV segment retail sales nearly tripled during the year giving an added fillip to the overall sales in fiscal 2023.

However, the higher interest outgo with increased repo rates and further increase in vehicle prices restricted the growth of two wheeler industry sales during fiscal 2023.

2W Industry sales further increased 13% further during fiscal 2024 backed by further improvement in macro-economic scenario, rural support, continued traction for premium motorcycles as well as scooters. Furthermore, continued demand for electric two wheelers despite the subsidy cut supported the growth in fiscal 2024. The new launches especially in the premium segments provided an added support to the demand. Additionally, commuter motorcycles segment witnessed some improvement during the year after consecutive contractions aided by limited rise in operating costs as well as increased customer incentives.

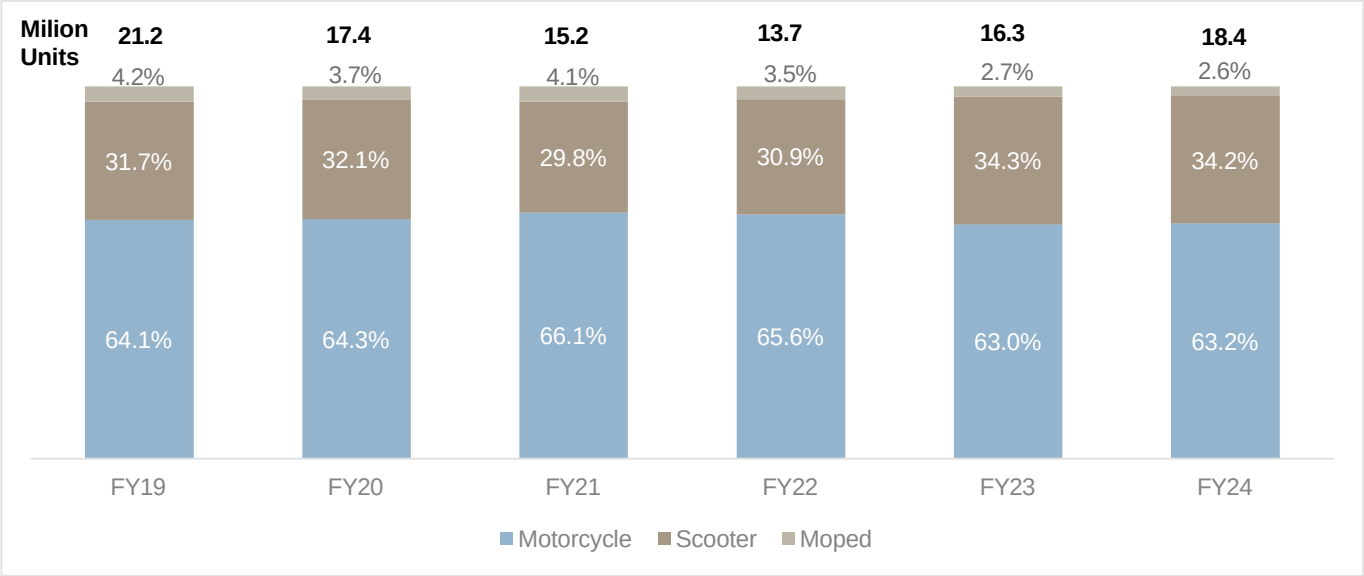
In the last 5 years, the electrification within the industry has provided a thrust to the industry sales. Even during the years, when the ICE vehicle sales slid, the sharp rise in EV retails restricted the drop in industry sales volumes. During fiscal 2019 to fiscal 2024 period, ICE segment contracted at 3.7% CAGR and EV retails skyrocketed with a 101.7% CAGR, albeit from a lower base, which arrested the drop in the industry sales.

Segment wise domestic sales trend

Motorcycles dominate the domestic two-wheeler industry sales with more than 60% contribution to the annual domestic sales. However, their contribution has gradually contracted over the years, from 78% in fiscal 2009 to 63% by fiscal 2024.

On the other hand, the scooters segment expanded its presence over the long-term horizon; from 15% in fiscal 2009 to 34% in fiscal 2024. The mopeds segment also lost some ground to scooters over the years, from around 6% share in fiscal 2009 to ~3% in fiscal 2024.

Domestic two wheeler sales segmental trend – fiscals 2019 to 2024



Note: Data includes ICE and EVs; EV retail data from VAHAN has been considered.

Source: SIAM, VAHAN, CRISIL MI&A

Scooters

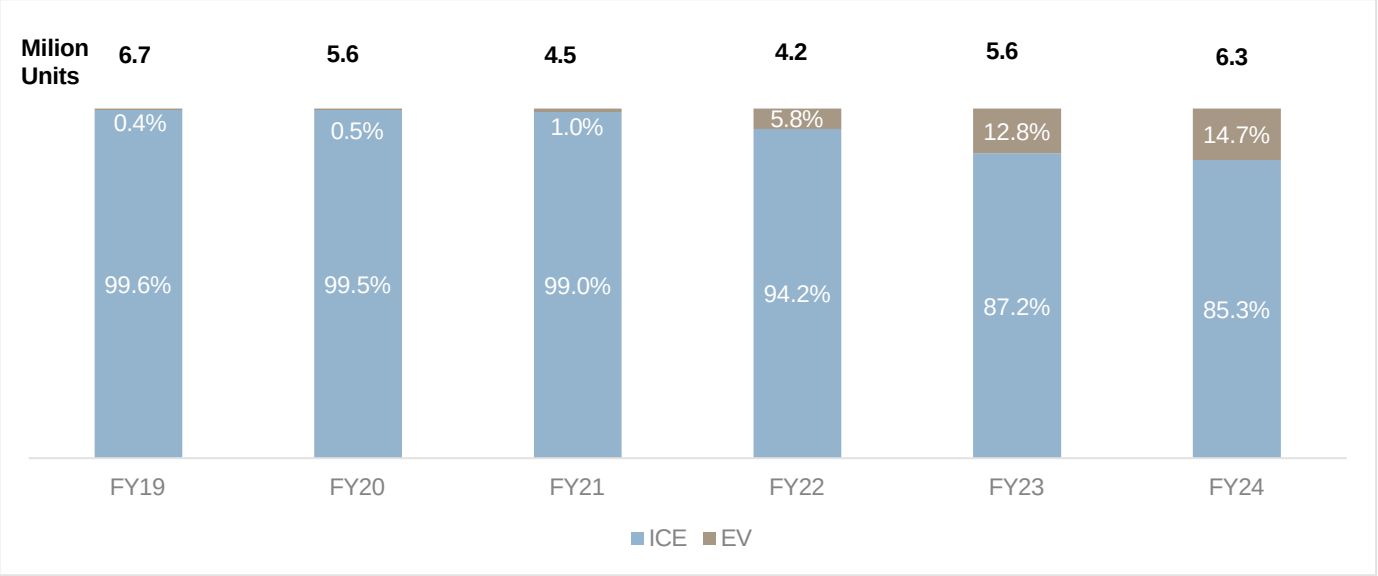
In the last 5 years, share of scooters increased from 31.7% in fiscal 2019 to 34.2% in fiscal 2024. The share of the scooters segment increased on the back of strong demand from new model launches (like the Dio 125, Avenis, upgrades of Activa, Jupiter as well as e scooters), increasing usage of scooters by working women in urban areas (due to high convenience) and a growing preference as a second vehicle in households. Multiple ownerships of vehicles including a passenger vehicle, multiple two wheelers in a single family have risen, boosting demand.

Scooters also found acceptance in rural areas with increasing road penetration and scooters emerging as utility vehicles. Earlier, the scooter was positioned primarily as an urban vehicle. Now, it has gradually evolved to become a preferred way of commute for females in rural areas as well.

Thus, even in the industry slowdown during fiscals 2019-2024 period, the overall scooters segment contracted at the slowest pace of 1.3% CAGR vis a vis 3.0% CAGR contraction for motorcycles and 11.4% CAGR contraction for mopeds. Sharp rise in E scooter sales as well as model launches especially in the premium (=> 125cc) scooters segment restricted the drop in scooter sales.

During the pandemic, reduced need for mobility due to lockdowns, closure of schools/ colleges and offices impacted the scooter demand significantly. Sales of scooters (ICE+ EV) witnessed a sharp drop of 19% in fiscal 2021 and a further drop of 6% in fiscal 2022. However, scooter sales rebounded in fiscal 2023 led by reopening of offices, schools & colleges. Pent up demand from the last two years provided the thrust to the scooters sales. Moreover, the increased retails of e-scooters provided an additional boost to the scooter sales during the year. Scooters segment grew at a faster pace of 32% y-o-y compared to 14% growth witnessed in motorcycles, thus backing the share expansion of scooters during the fiscal 2023 . During fiscal 2024, both motorcycles and scooters increased at a healthy pace of around 14% keeping the share near steady.

ICE vs EV split within domestic scooter sales – fiscals 2019 to 2024



Note: EV retail data from VAHAN has been considered.
Source: SIAM, VAHAN, CRISIL MI&A

Within the scooters segment, EV scooters witnessed growth at an accelerated pace and contributed a sizeable share of 14.7% to overall scooter sales in fiscal 2024. Launch of new models, government incentives, rising awareness, increased acquisition & operating costs for the ICE equivalents provided boost to the EV sales during

the fiscal 2019-2024 period. The EV scooters clocked growth at 101% CAGR in the last 5 years and their penetration within the scooters segment rose from 0.4% in fiscal 2019 to 14.7% in fiscal 2024.

On the other hand, the ICE scooter segment witnessed contraction amidst the reduced mobility, increased vehicle prices (due to BSVI compliance), higher operating costs (fuel price hike), increased interest outgo as well as increased competition from EVs. During fiscal 2019 to fiscal 2024 period, ICE scooter sales contracted at 4.3% CAGR.

Even within ICE scooters, the dominant 110 cc scooter segment (80% share in fiscal 2019) saw a sharp decline at 11.5% CAGR. The customer base of 110 cc scooters is relatively price conscious. The increased ownership and operating costs as well as reduced usage requirement during the pandemic years led significant postponement of purchase from this customer segment. Additionally, the shift towards premium ICE scooters (=>125 cc) as well as EVs exacerbated the situation for the 110 cc ICE scooters. In turn, their share within the ICE scooter segment, slid from ~80% in fiscal 2019 to 53% by fiscal 2024.

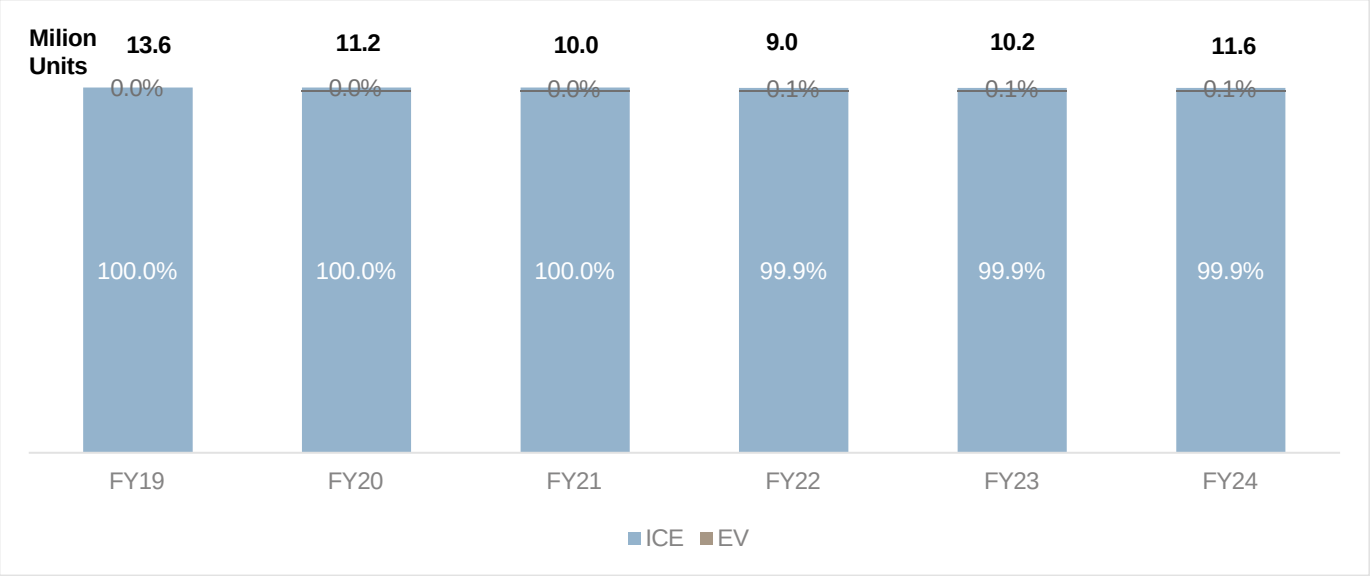
Contrarily, the premium scooters (=>125 cc) segment, clocked a growth at 12% CAGR during the period, albeit from a smaller base. A relatively price agnostic customer base, feature rich attractively designed vehicles, young buyers that prefer high performance and advanced features , auto OEM focus, multiple vehicle launches and premiumization trend aided the growth of this segment. The share of premium scooters within the ICE scooter segment rose from about 20% in fiscal 2019 to 47% by fiscal 2024.

Motorcycles

In the overall domestic sales, motorcycles have maintained their leading position in the last 5 years, however, they lost some ground to scooters during the period. During the pandemic period of fiscal 2021 & fiscal 2022, reduced requirement of scooters and continued requirement of motorcycles especially for daily commute amidst the lack of availability of public transportation backed the demand for motorcycles and restricted their fall.

During the pandemic, availability of public transportation was limited, even the shared mobility options including office buses and taxis wer restricted making personal vehicles including motorcycles the primary option for daily commute especially for the blue-collar workers and rural customer base. Relatively prosperous customers, women commuters especially from urban background were utilizing the work from home option or their four wheelers limiting the requirement of scooters during that period. This aided the moderate market share expansion during fiscal 2021. Post pandemic, improving mobility and gradual rise in scooters demand caused the share of motorcycles to contract in the next 3 fiscals and reach 63% by fiscal 2024.

ICE vs EV split within domestic motorcycles sales – fiscals 2019 to 2024



Note: EV retail data from VAHAN has been considered.
Source: SIAM, VAHAN, CRISIL MI&A

Unlike scooters, the EV penetration within motorcycles has remained inconsequential amidst lack of EV options. Few OEMs like Revolt offered EV motorcycles from fiscal 2020. Manufacturers like Tork and Ultraviolette also introduced their e bikes/ motorcycles in the next 2/3 years. However, given limited vehicle options that too in the premium motorcycles category, higher acquisitions costs, larger range anxiety concern due to higher daily running for motorcycles; the adoption of EVs within motorcycles was only gradual and reached only 0.1% of overall motorcycle sales by fiscal 2024. And the ICE variants continued to dominate the motorcycle sales. However, even within the ICE motorcycles, the premium motorcycles segment (=>125 cc) has witnessed 3% CAGR growth during fiscal 2019-2024 period while the commuter motorcycles segment (<=110 cc) contracted at a rapid pace of 8% CAGR.

The price sensitive commuter segment (62% share in fiscal 2019) has been under pressure amidst the sharp rise in vehicle prices due to emission and safety norms, increased insurance costs, hike in fuel prices, escalated interest costs coupled with pressure on incomes of this customer segment especially during the pandemic. The commuter motorcycle segment witnessed 3 years of consecutive contraction between fiscal 2020 to fiscal 2022 (16% CAGR drop till fiscal 2022).

On this lowered base, commuter motorcycles segment saw some growth during fiscals 2023 and 2024 aided by the pent-up demand and added support from OEMs in the form of discounts and other incentives. However, for the complete 5-year period, the commuter motorcycles segment witnessed contraction at 8% CAGR.

On the other hand, the premium motorcycles segment witnessed growth at 3% CAGR backed by lower impact of the pandemic on the financially stable customer base, higher OEM focus with increased vehicle launches, feature rich attractive vehicle introductions, and entry of global players like Harley, Triumph with India focussed models in the premium motorcycles segment. High performance tech enabled vehicles see higher acceptance among the rising younger buyer base who view vehicle as an extension of their personality. Thus, the share of premium motorcycles, within the ICE motorcycles, increased from 38% in fiscal 2019 to 52% by fiscal 2024.

Segmental growth within the industry in the last 5 years

Segment	FY19-FY24 CAGR	FY19 share	FY24 share

Motorcycles	**(3.0) %**	**64.1%**	**63.2%**
ICE	(3.1) %	64.1%	63.1%
EV	NM	0.0%	0.1%
Scooters	**(1.3) %**	**31.7%**	**34.2%**
ICE	(4.3) %	31.6%	29.2%
EV	101.3%	0.1%	5.0%
Mopeds	**(11.4) %**	**4.2%**	**2.6%**
Total	**(2.8) %**	**100%**	**100%**

Note: NM: Not meaningful; Figures in bracket to be read as negative (Eg. (10) to be read as minus 10), EV retail data from VAHAN has been considered.
Source: SIAM, CRISIL MI&A

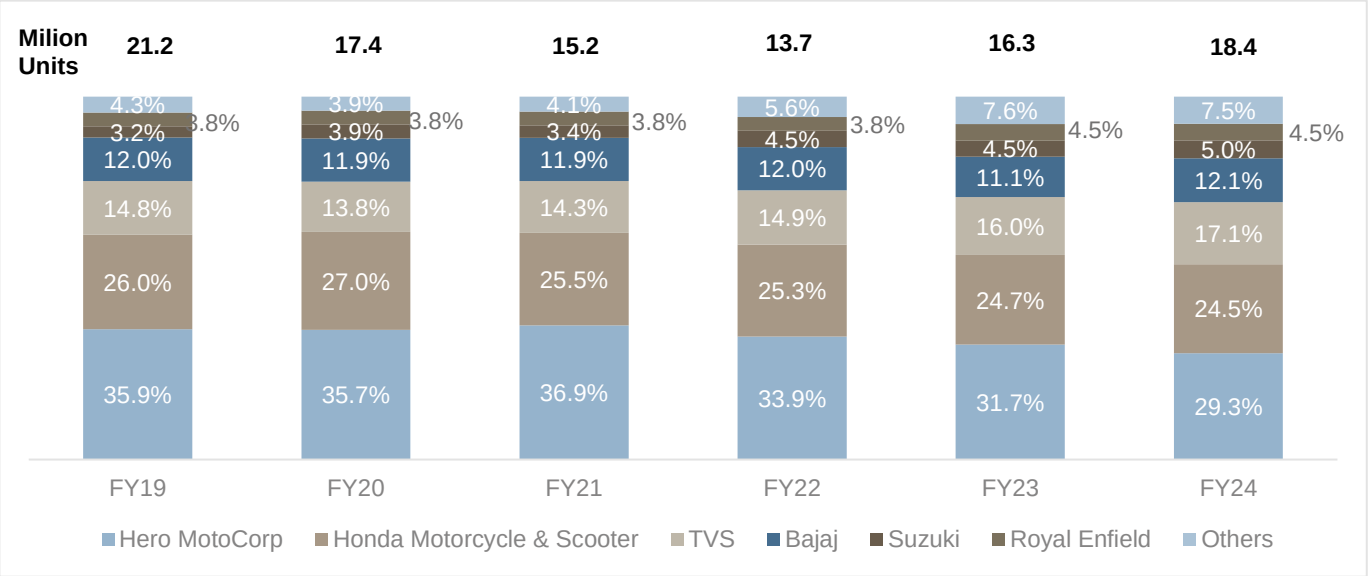
The smallest segment of mopeds witnessed a contraction during fiscal 2019-2024, amidst the increasing adoption of scooters in the semi-urban and rural markets — historically major markets for the moped —led to a loss in the market share of mopeds. Limited product portfolio and no new launches also impacted the sales of this segment. Moreover, the pressure on the income of the bottom of the pyramid customer base of mopeds as well as increased operating expenses due to increased fuel costs, higher interest outgo; demand for the segment got impacted. In turn, the share of mopeds dropped from 4.2% in fiscal 2019 to 2.6% in fiscal 2024.

Competitive landscape of the domestic two-wheeler industry

India's Two-wheeler industry is an oligopolistic market with the top 4 players contributing more than 80% of the annual sales. However, over the years, the competition has intensified within the industry, especially, with the entry of new age startups like Ola, Ather, Okinawa catering to the fast-expanding segment of EVs. In fact, the contribution of top 4 OEMs has gone down from 89% in fiscal 2019 to 83% by fiscal 2024.

Hero MotoCorp (HMCL) continued to lead the market, although HMCL's contribution slid from ~36% in fiscal 2019 to 29.3% in fiscal 2024. The increased traction for scooters including E scooters as well as premium motorcycles coupled with pressure on commuter motorcycles sales – where HMCL dominates – have impacted its share. The second largest contributor Honda Motorcycle & Scooter (HMSI) has also lost some ground to other players, especially the E scooter manufacturers.

OEM wise contribution to overall two-wheelr domestic sales – fiscals 2019 to 2024

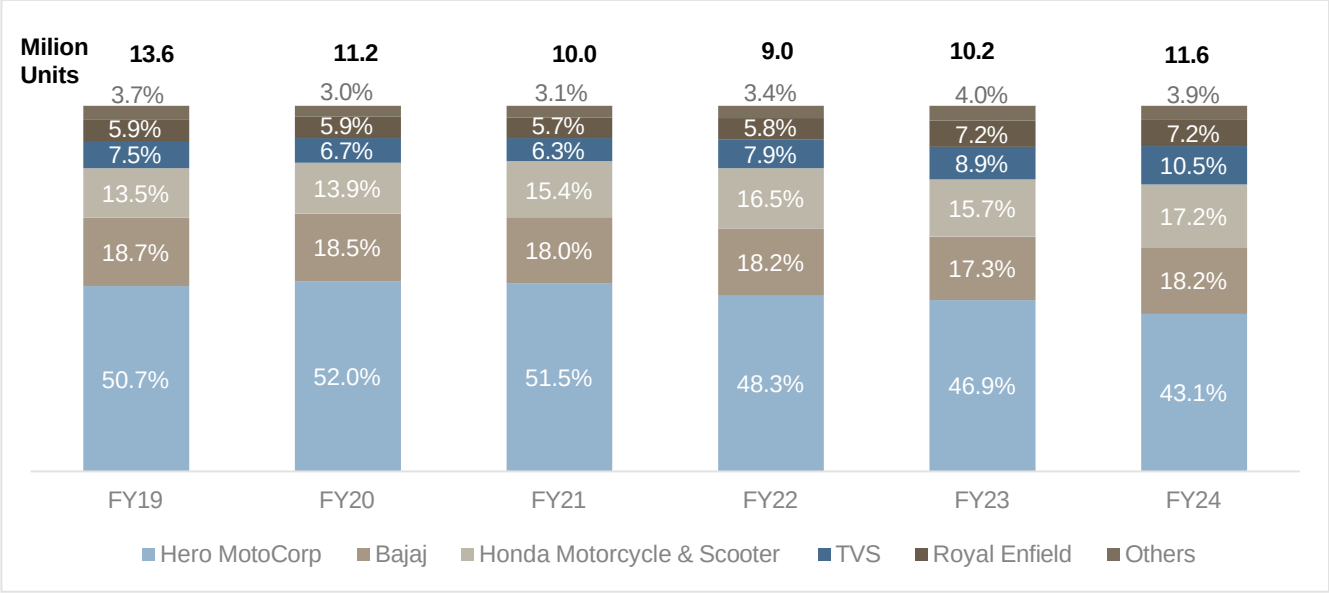


Note: Data includes ICE and EVs; EV retail data from VAHAN has been considered.
Source: SIAM, VAHAN, CRISIL MI&A

With the continued traction for its premium motorcycles and scooters- especially Jupiter coupled with rising adoption of its E scooter model iQube, TVS has gained further ground in the market during the period. Bajaj successfully maintained its ~12% share in the last 5 years. Multiple launches in the premium motorcycles segment as well as increase in production & sales of its Chetak E scooters have aided its sales. Rising sales of premium scooters backed Suzuki's share expansion while multitude of launches in the growing premium motorcycles segment led to share expansion for Royal Enfield.

Recent entrants like Ola and Ather have also grabbed notable share from the legacy OEMs led by the rising electrification within the domestic two-wheeler market. As of fiscal 2024, Ola & Ather contributed 2% and 1% respectively to two-wheeler annual domestic sales.

OEM wise contribution to domestic Motorcycle sales - fiscals 2019 to 2024



Note: Data includes ICE and EVs; EV retail data from VAHAN has been considered.
Source: SIAM, VAHAN, CRISIL MI&A

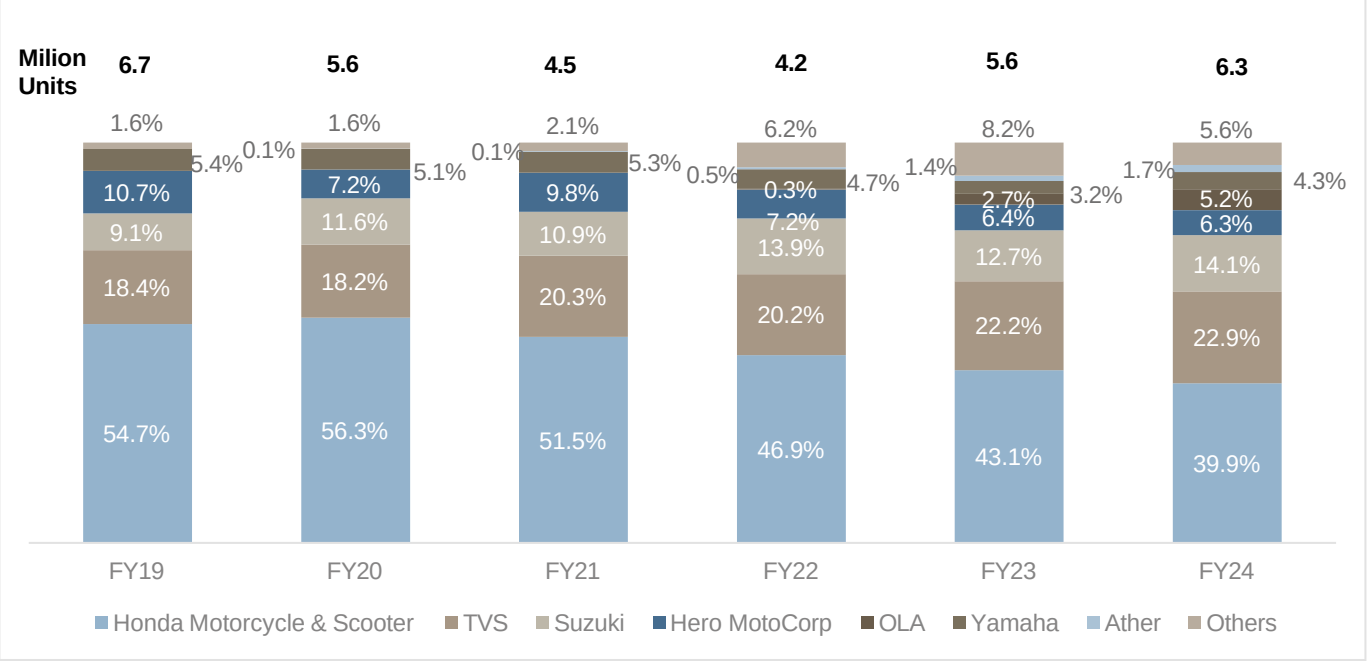
The overall motorcycles segment is dominated by HMCL, that is also the leader in the commuter motorcycles segment. However, given the pressure on sales of the commuter motorcycles segment and intensifying competition in premium motorcycles, HMCL lost some ground to TVS, HMSI and Royal Enfield from an initial high base. Although HMCL witnessed some contraction in commuter motorcycles, the increased traction for its premium models like the XPulse, Xtreme as well as demand for its recent launches like the Karizma, Harley X440 in the premium motorcycles segment restricted the contraction in its share.

Bajaj maintained its second position in the market in the last 5 years with continued traction for its motorcycles especially for its Pulsar range and increased demand for its latest launches including the Triumph vehicles. HMSI has expanded its presence in the motorcycles market amidst continued demand for its models like Shine 125, SP 125 coupled with its entry into the 100 cc category with Shine 100. The launch of the SP160 model also aided its share expansion during fiscal 2024.

In line with HMSI, TVS has also grabbed additional share in the motorcycles segment supported by high demand for its Raider 125 model coupled with increased push from its recent launch, the Ronin, in the premium segment. TVS also witnessed contraction in the commuter segment amidst the reduced demand for the segment as well as premiumization trend in the two-wheeler industry.

Royal Enfield, with its entire focus on the premium motorcycles segment expanded its presence further with faster growth in the premium segments. Moreover, increased support from the competitively priced model the Hunter 350 aided its growth in the last 2 years.

OEM wise contribution to domestic Scooter sales - fiscals 2019 to 2024



Note: Data includes ICE and EVs; EV retail data from VAHAN has been considered.
Source: SIAM, VAHAN, CRISIL MI&A

HMSI leads the scooters segment with its Activa model. Amidst intensifying competition, the company has lost ground to TVS, Suzuki as well as the recent entrants OLA & Ather. However, increased demand for the premium variants of its scooters Activa 125 and Dio 125 helped the company limit its share contraction.

Increased traction for its E scooter iQube as well as added support from premium variant of its popular model Jupiter supported TVS' share expansion within scooters segment.

Suzuki is primarily focussed on the premium scooters segment. Premiumization within the industry as well as healthy demand for its recent launch, the Avenis, aided Suzuki's share expansion within the scooters segment.

Amidst the electrification trend, especially within the scooters subsegment, OLA and Ather gained a foothold in the overall scooters segment within a short span. With its leading contribution in the E scooters subsegment OLA garnered a sizeable 5.2% share, and Ather contributed ~2% to the overall scooters segment in fiscal 2024. (EV segment is covered in detail in later chapters).

In the last 5 years, Yamaha maintained its share in 3-5% range led by continued demand for its RayZR series. The recent launch of the Aerox scooter range helped Yamaha expand its presence and regain some lost ground during fiscal 2024.

For the mopeds segment, TVS contributes the entire sales. TVS is the only OEM offering mopeds in the domestic market.

Demand drivers and trends in the domestic two-wheeler market

The performance of the Indian 2W industry is dependent on numerous social and economic factors, including demographic trends and preferences, income levels, affordability of 2W vehicle customers, changes in government policies, overall economic conditions as well as availability of finance and interest rates. Certain factors, such as general macroeconomic and consumer trends, have direct impact on demand for 2W vehicles.

According to International Road Federation - World Road Statistics 2023 report, India had around 243 million two wheelers in use in CY 2020 ie India had 175 two wheelers for every 1000 people. This two-wheeler penetration of India is much lower than many of the Southeast Asian countries' like Taiwan (592 two wheelers per 1000 people), Indonesia (423), Malaysia (406 – as of 2018) and Vietnam (613 – as of 2018).

Country	Two-wheeler penetration (per thousand people)
India	175
Brazil	136
Mexico	42
Indonesia	423
Malaysia	406*
Taiwan	592
Vietnam	613*
Korea	44
USA	25

China	51
Japan	82

*Note: Data for 2020; *: Data for 2018*
Source: International Road Federation- World Road Statistics 2023

This provides a sizeable headroom for the two-wheeler industry to grow going forward. Some of the key drivers aiding India's domestic two-wheeler industry demand are:

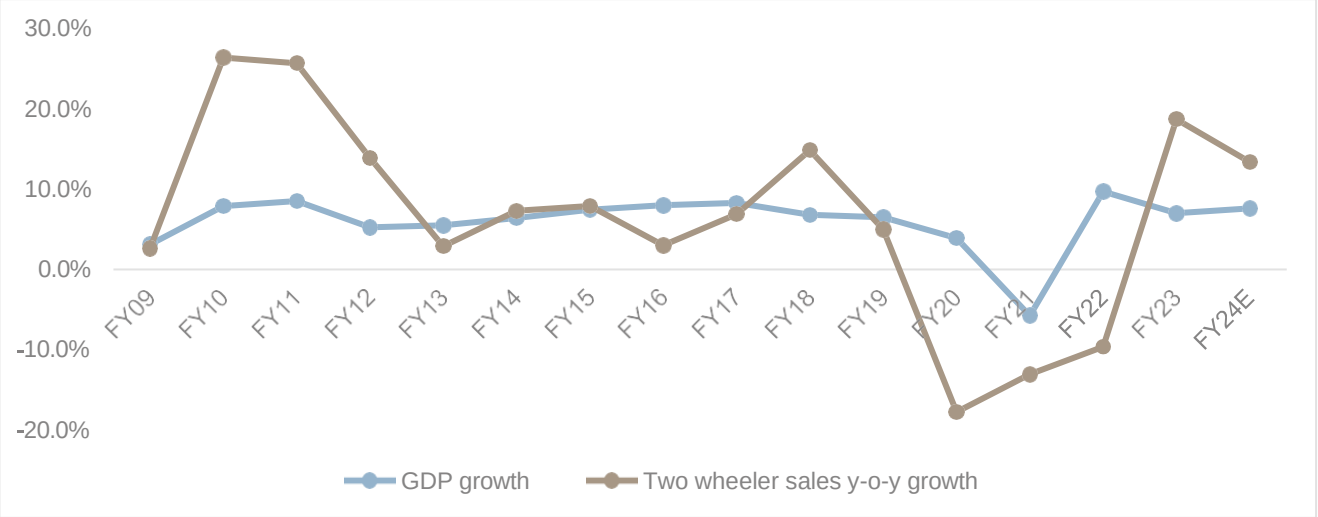
Macroeconomic suppor

The primary demand drivers for the two-wheeler industry are improving affordability and lower cost of acquisition and ownership. Macroeconomic factors primarily determine the disposable income and affordability for customers.

During the fiscal 2009 -2019 decade, India's GDP grew at a healthy pace of 7% CAGR aiding the affordability of the customer base. The private final consumption expenditure also expanded in tandem with the GDP growth during the same time.

This improvement in income levels translated into a healthy growth for the domestic two-wheeler industry at 11% CAGR. Industry achieved this growth despite a few hurdles including the demonetisation, implementation of the Goods and Services Tax, as well as the implementation of BSIV norms which pushed the vehicle prices up during fiscal 2018.

GDP vs two-wheeler industry growth trend



Source: MoSPI, SIAM, VAHAN, CRISIL MI&A

After this healthy growth, slowdown in the GDP growth during fiscal 2020 and the pandemic induced economic contraction in fiscal 2021 impacted the healthy run of the domestic two-wheeler industry further. Improvement in the macro-economic scenario post the pandemic, with reopening of the economy has aided the two-wheeler sales growth in the last 2 years.

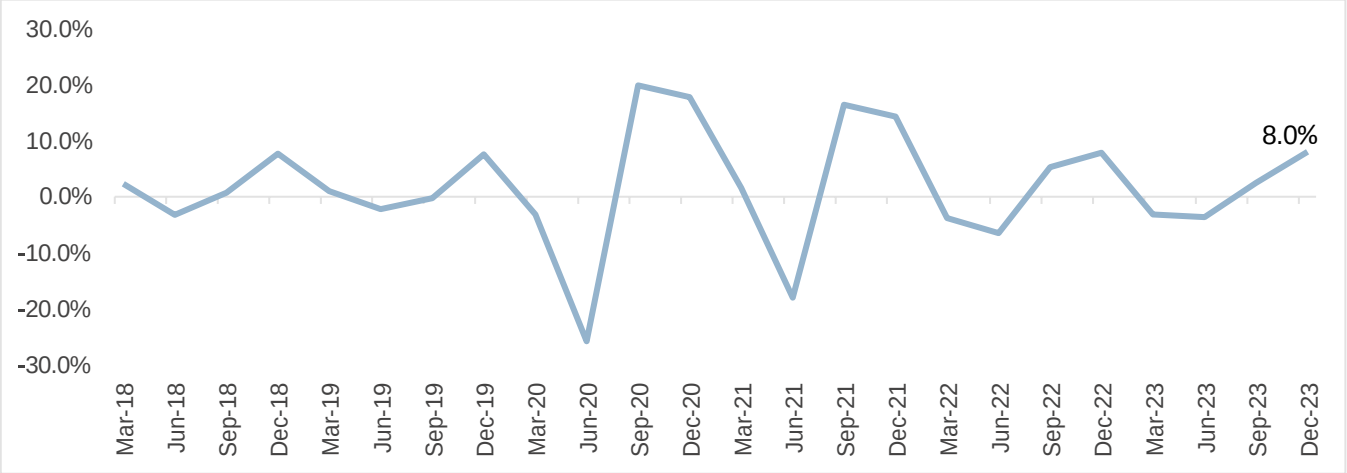
Going ahead, CRISIL expects India's GDP to clock a healthy growth at 6.5-7.5% CAGR (till fiscal 2031) aiding the growth of domestic two-wheeler industry sales over the long-term horizon.

Private consumption

PFCE reflects the overall consumption patterns and spending capacity of households within an economy. When PFCE increases it often translates to increased demand for various goods and services.

Private final consumption expenditure (PFCE) rose marginally to 3.5% year-on-year in third quarter of fiscal 2024 compared with 2.4% the previous quarter but remains sluggish. Rural demand indicators were a mixed bag, with demand for work under National Rural Employment Guarantee Act (NREGA) slowing this quarter, and growth in two-wheeler sales surging. However, growth in consumer non-durables production slowed considerably in the third quarter. Urban demand seemed to have sustained some momentum in the third quarter, with a pick-up in the growth of passenger vehicle sales and consumer durables production, as well as continued double-digit growth in retail credit (18.1% versus 18.3% in the previous quarter). The latter indicates that the impact of past rate hikes and regulations on unsecured lending are still pending.

PFCE Quarterly Trend for India



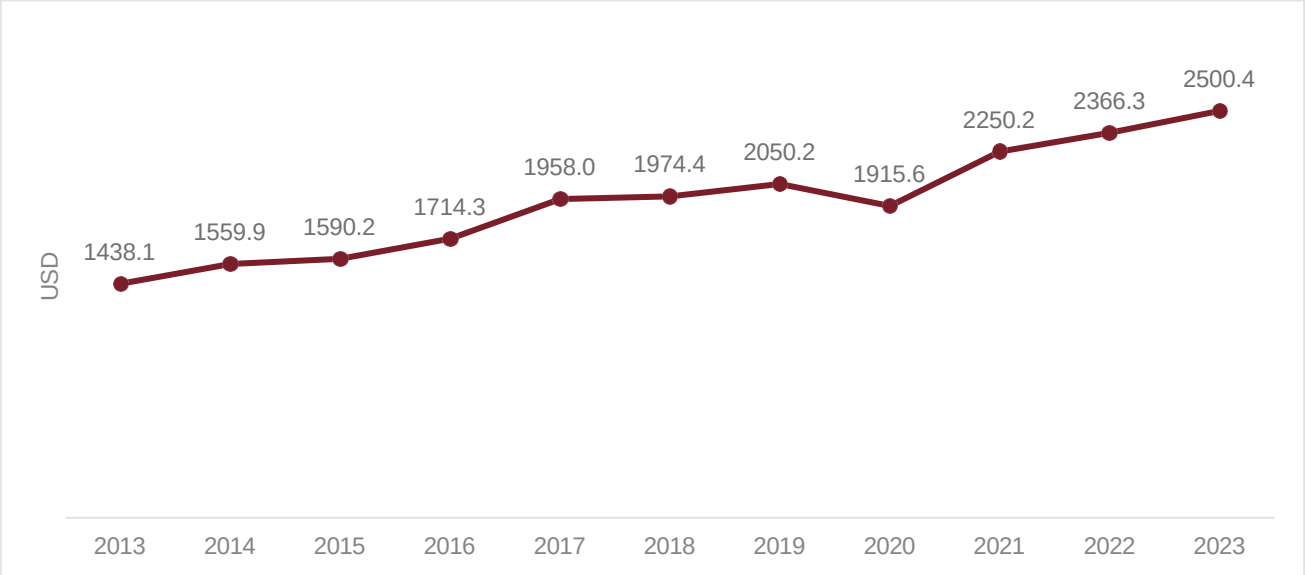
Source: Industry, CRISIL MI&A

Per Capita Income

Per capita income shows the increase in income thereby indicating economic well-being and average living standard of population in a country.

According to International Monetary Fund (IMF), India had a GDP per capita of USD 2,500 in 2023 compared to USD 1,438.1 in 2013. It has increased at a CAGR of 5.7% in the last 10 years. In 2020, the GDP per capita decreased by 6.6% owing to the pandemic and nationwide lockdown which impacted the manufacturing and service sector. However, in 2021 these sectors returned to normalcy and GDP per capita increased by 17.0% to reach USD 2,250.2.

GDP per capita in USD from CY2013-2023



Source: IMF April 2024 Database, CRISIL MI&A

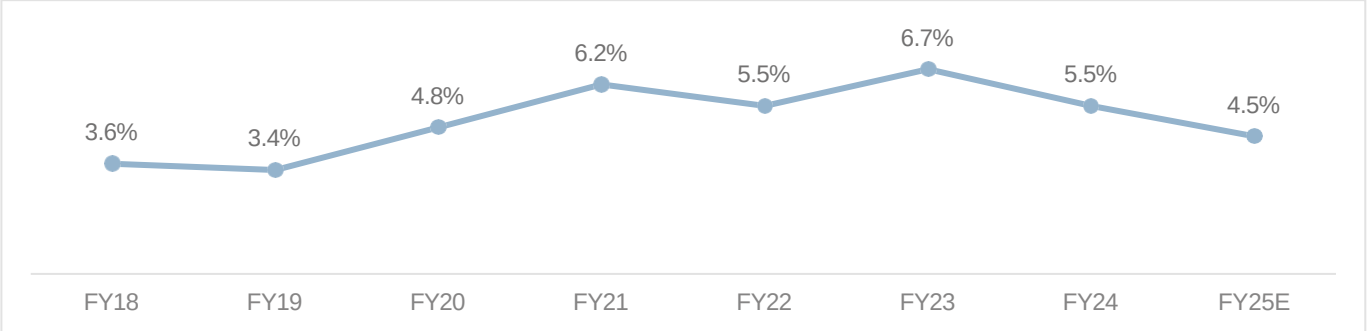
Going ahead, IMF expects the GDP per capita to grow at a faster rate of 9.3% and reach USD 4281 levels by 2029. Continued improvement in GDP per capita to aid two-wheeler segment growth over the long-term horizon.

Inflation

High inflation levels have a negative impact on the overall disposable incomes and affordability of the customer base. And given the relatively weaker financial position of two-wheeler buyers vis a vis buyers of other vehicle segments, high inflation levels can have a pronounced impact on the sales of two wheelers, especially the commuter motorcycles and 110 cc scooters segment. The high inflation periods witnessed the industry contraction during the fiscal 2020-fiscal 2022 period. Although the industry clocked growth in fiscal 2023 (from a lower base), the commuter segments continued to face pressure. Moderation in inflation levels helped industry clock further growth during fiscal 2024.

Further improvement in inflation levels is expected in the shorter term which will support the growth of two-wheeler industry going ahead.

CPI trendline



Source: Ministry of Statistics and Programme Implementation (MOSPI), CRISIL MI&A Research

Rural Infrastructure

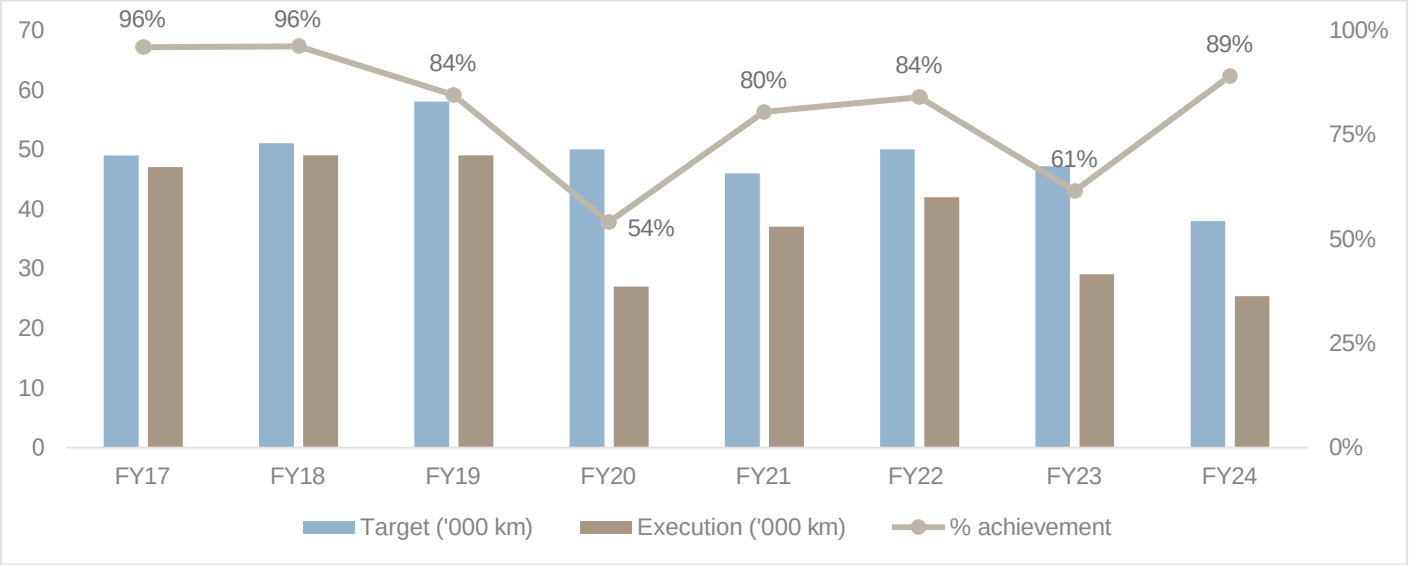
Rural infrastructure also has a pronounced impact on rural incomes and, in turn, two-wheeler sales. Under the Pradhan Mantri Gram Sadak Yojana (PMGSY), launched in 2000, the government aims to build all-weather roads in rural India to improve connectivity as well as support the rural economy.

Over the years government has successfully executed major portion of the PMGSY annual target set for the year. Even during fiscal 2024, government achieved 89% of the target with an addition of 26 thousand km of rural roads constructed against the target of 38 thousand km.

Expansion of the rural road network not only improves connectivity but also aids the rural economy. Improvement of rural infrastructure impacts 2W demand in two ways - directly, by generating employment in the rural economy during the construction of roads, thereby increasing wages and overall income, and indirectly by enabling mobility and accessibility.

Thus, the continued expansion in rural infrastructure is expected to back two-wheeler demand growth over the long term horizon.

PMGSY execution



Source: NHAI, MoRTH, CRISIL MI&A

Rural income growth is an important determinant of two-wheeler demand in India. Rural sales contribute nearly 55-60% of the domestic sales in India.

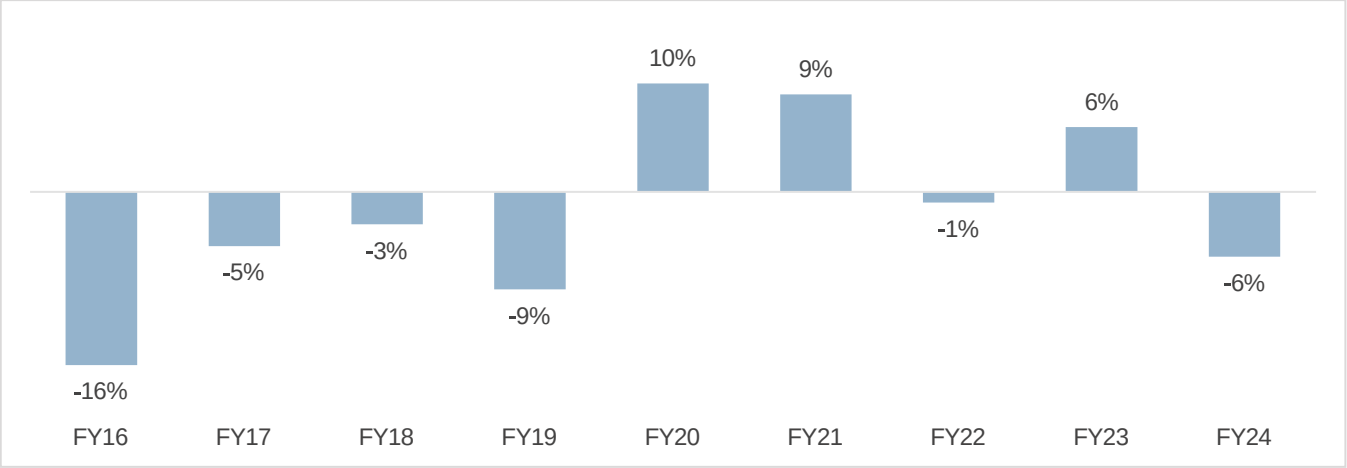
Within two wheelers, although motorcycles are the preferred choice for rural customers, improvement in rural infrastructure and road connectivity has helped scooters segment to make in roads in rural areas. With rising electrification, a significant portion of EV demand is also coming from tier 3 and rural areas. So, the rural incomes have a direct bearing on the two-wheeler industry sales.

Rural India is still primarily agrarian and with 86% of land holdings, small and marginal farmers dominate the Indian agricultural landscape. These farmers rely on monsoon for irrigation; hence, its timely arrival and adequacy are needed for a good crop. Any negative impact on crop supply due to low rainfall has a cascading effect on the Indian economy, as it leads to higher food prices and subsequently lower discretionary spending. As per the India Meteorological Department (IMD), monsoon deviation was 6% in fiscal 2023.

Monsoon has been favorable over the past few years with deviation in the acceptable range. Fiscal 2024 witnessed an uneven spread of rainfall during the initial months. Rabi output was favorable last fiscal, supporting farmer income during the early months of fiscal 2024. In fiscal 2024, kharif sowing was initially delayed owing to delay in monsoon. However, sowing has picked up in recent months. Moreover, higher minimum support price (MSP) this fiscal and good price in the mandis have maintained on-ground positivity.

In fiscal 2025, IMD expects the monsoon to be normal which is expected to boost the agri incomes in the short term horizon.

Rainfall Deviation Trend



Source: IMD, CRISIL MI&A
Note: When the rainfall averaged over the country is within ±10% from its long period average (LPA) or 90% to 110% of LPA, the rainfall is said to be "normal". The LPA for the June to September period is 868.6mm.

Financing support

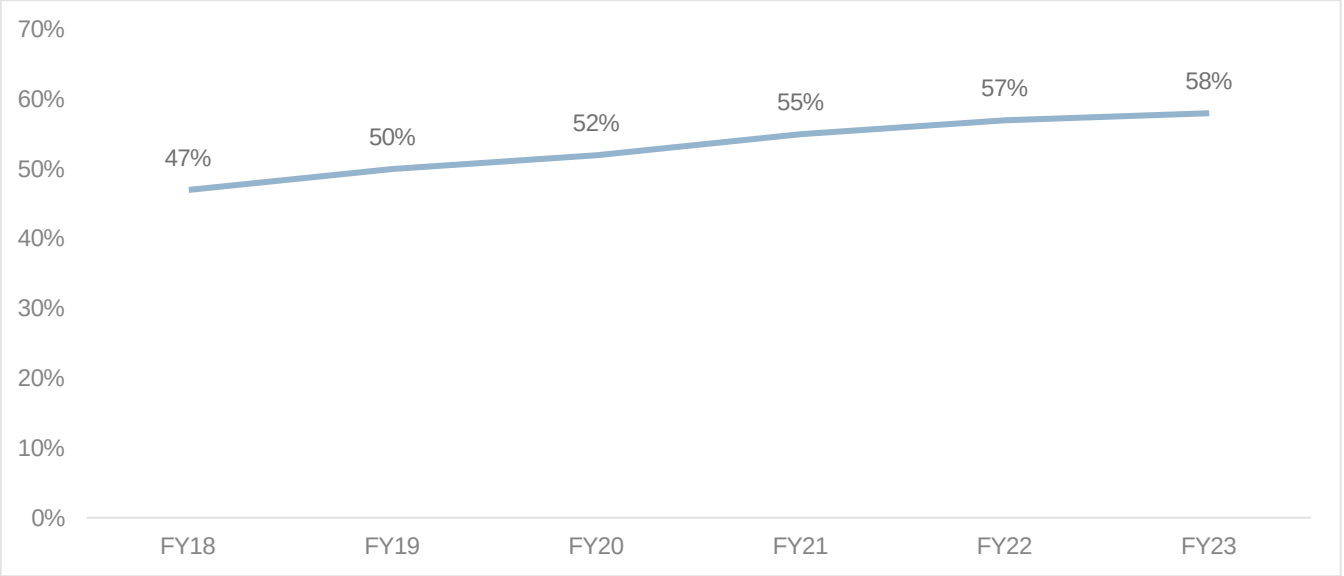
Finance support plays an important role in the overall demand growth of the two-wheeler industry given the relatively lower income profile of customers as well as smaller ticket size of the industry.

Over the years, amidst the intensifying competition, financial institutions have expanded their reach to gain further market share within the auto finance industry. Moreover, the entry of NBFCs which focus primarily on non-metros, expanded the reach of the financing system further as banks primarily catered to the urban and salaried customers.

This expansion aided the growth of overall finance penetration in the industry and in turn supported the growth of the domestic two-wheeler industry. Additionally, financiers have been offering a wide range of schemes and promotions (such as low-down payment, attractive EMI options, waiver of processing fees) to attract more customers for small ticket-sized purchases aiding the finance penetration within the two wheeler industry.

Going forward, CRISIL MI&A expects the finance penetration to improve further and support the growth of two-wheeler industry.

Two-wheeler finance penetration trend



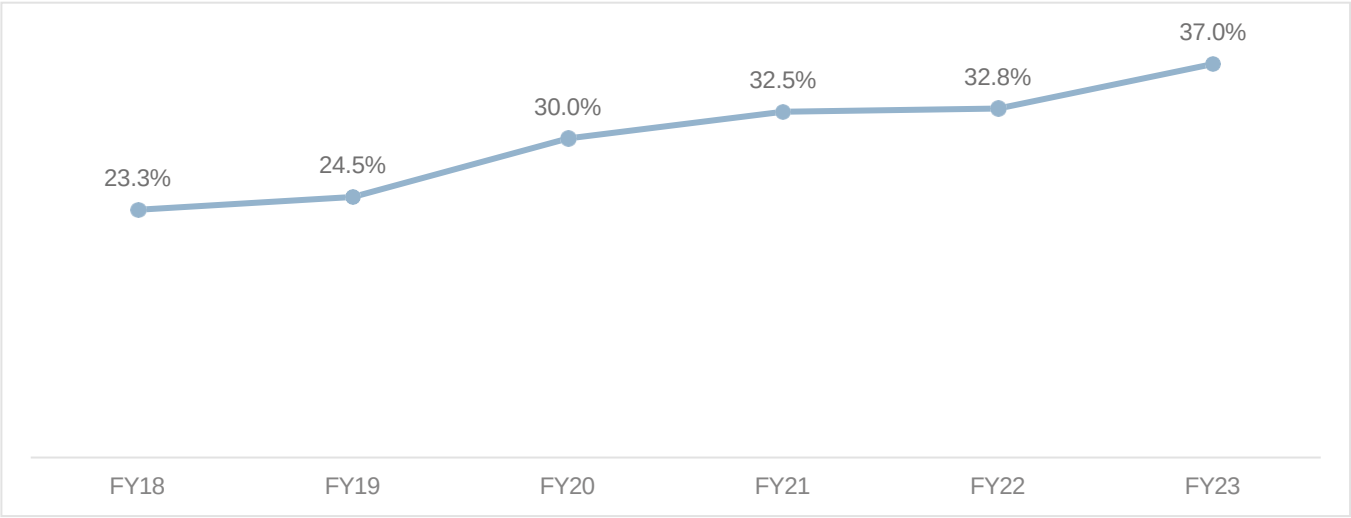
Source: CRISIL MI&A

Women participation in the workforce

Increasing female/ women participation in the Indian workforce has provided an additional boost to the two-wheeler, especially scooter sales. Given the added comfort in terms of ease of seating, lower vehicle weight, easy manoeuvrability and baggage space, scooters are the preferred vehicle choice for most working women.

Over the last 6 years, female participation rate in the Indian labour force has witnessed a significant jump backed by long-term socio-economic empowerment initiatives by the government as well as improvement in education and other skills within the women population. There has also been an increased focus on increasing women participation by the corporates. This has led to improvement in the female participation and has boosted the demand for scooters in India. The female participation in the work force has also aided the overall household incomes, boosting the two-wheeler sales as well.

Female labour force participation rate trend



Source: CRISIL MI&A

Going forward, CRISIL MI&A expects the women to increasingly become a part on the workforce and support the long-term growth of the two-wheeler industry.

Growing gig economy

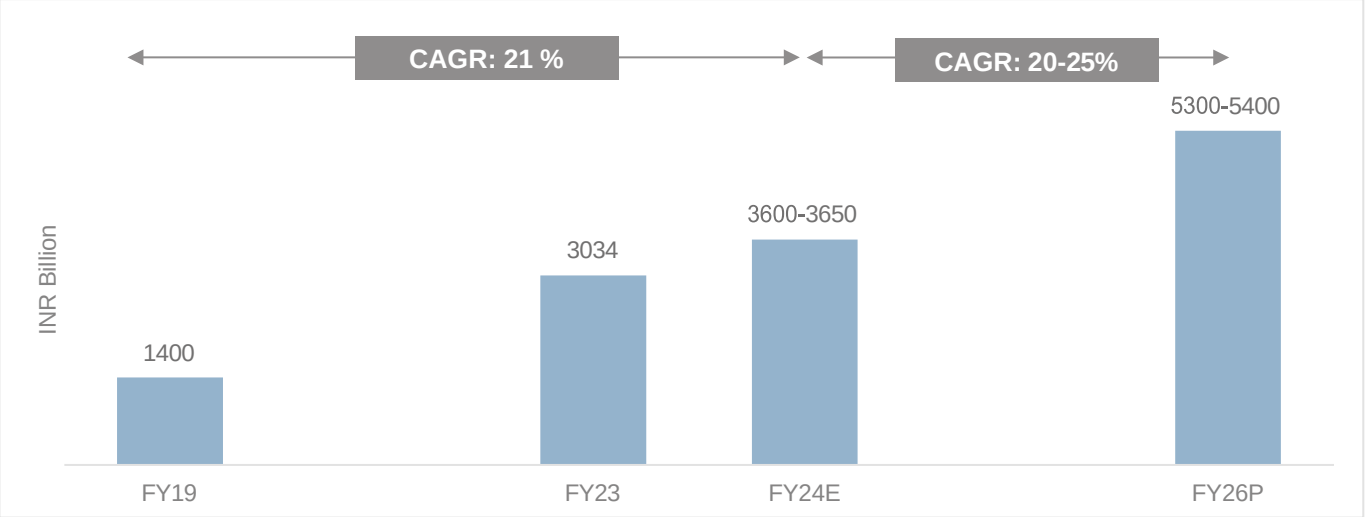
The gig economy is a significant contributor to the two-wheeler industry demand in the form of last mile delivery vehicle requirement.

According to NITI Aayog, there were nearly 6.8 million gig workers engaged in the gig economy including the food grocery, electronics, and e commerce last mile delivery work during fiscal 2020. The gig workforce is expected to expand to 23.5 million by fiscal 2030 backed by the expected rise in underlying industries of e commerce and food delivery services.

The Indian e-commerce industry, estimated at ~Rs 3,000 billion in fiscal 2023, has had a phenomenal run over the past few years. The industry has managed to attract not only consumers but also investors across the world and has grown more than three-fold between fiscals 2018 and 2023 on the back of rising internet penetration, increasing awareness of online shopping, and lucrative deals and discounts offered by well-established players and start-ups. However, growth moderated a bit, albeit remained healthy in fiscal 2023.

CRISIL MI&A projects the e-commerce industry to cross Rs 5.3 trillion by fiscal 2026, logging a CAGR of 20-25% between fiscal 2024 and fiscal 2026. This healthy growth is expected to support the demand for two wheelers in the long run.

E commerce industry outlook



Source: CRISIL MI&A

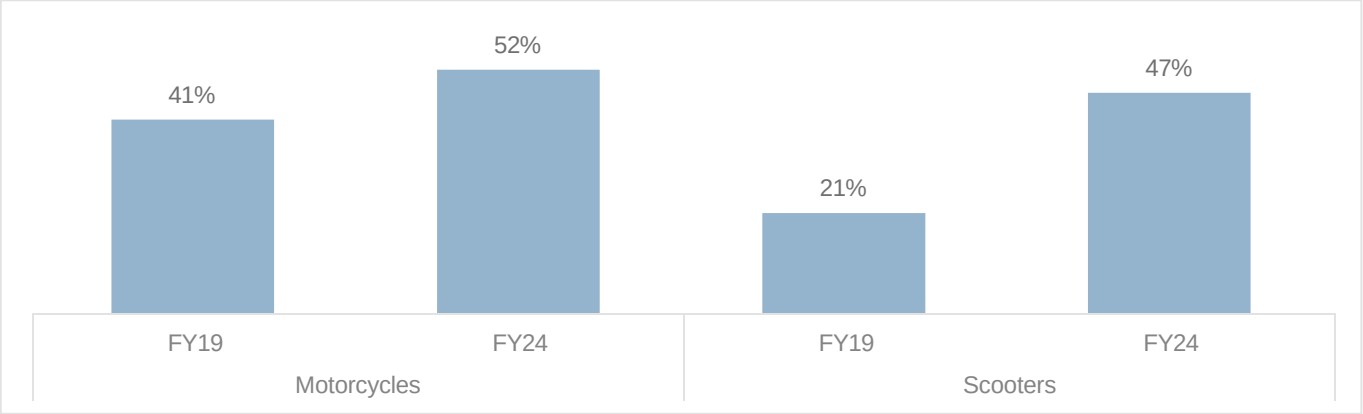
Premiumization in the industry

There is a clear shift towards premium vehicles being witnessed within the two-wheeler industry. Customers are looking to upgrade to the next premium vehicle segment within motorcycles as well as scooters. Younger profile of the buyers, attractive feature rich new vehicle launches at competitive rates, vehicle being seen as an extension of customer's personality, financing support, more launches in the premium segment has supported this premiumization trend within the two-wheeler industry.

In the last 5 years, the share of premium vehicles (=>125cc) increased significantly – from 41% in fiscal 2019 to 52% in fiscal 2024 for motorcycles & from 21% in fiscal 2019 to 47% in fiscal 2024 for scooters. Despite the commuter motorcycles and basic 110 cc scooters witnessing a sharp contraction, increased traction for the premium motorcycle and scooters segment restricted the fall in overall sales. In the last 5 years, the premium segments have primarily provided the thrust to the industry.

Over the long-term horizon, CRISIL MI&A expects the premiumization trend to support the overall industry growth and support the industry sales going forward.

Share of premium two wheelers



Note: Premium motorcycles/ scooters: => 125 cc vehicles
Source: SIAM, CRISIL MI&A

Electrification within the industry

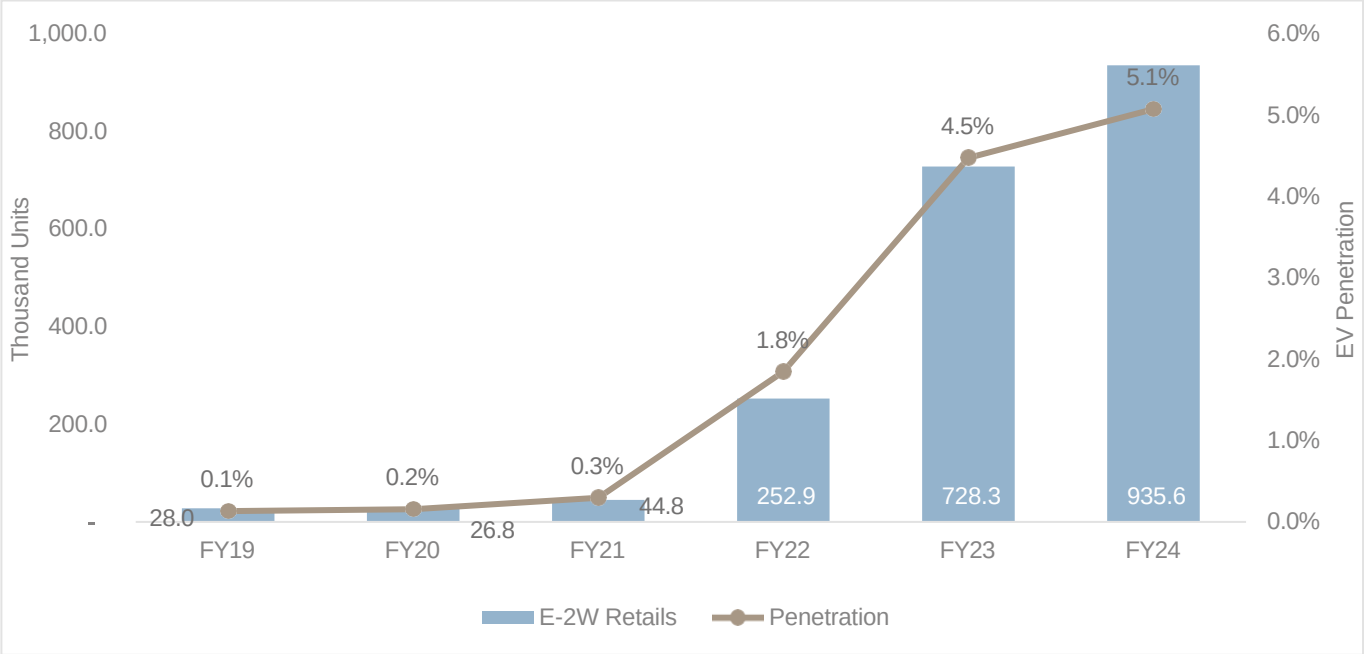
EVs are gaining global interest amidst the need to curb pollution. In India, too, EVs are gaining popularity, as the government is extending support via Faster Adoption and Manufacturing of Hybrid and Electric vehicles (FAME II) and tax rate cuts to encourage EV adoption. Further, growing awareness and concerns about environmental issues are likely to drive electrification in India.

EV sales have skyrocketed, especially post pandemic aided by the rising awareness, government support and expanding EV portfolio of the industry. The entry of the new age non-traditional OEMs like OLA, Ather, Okinawa provided an additional boost to the EV segment in India.

While the ICE two-wheeler sales contracted at 3.7% CAGR between fiscal 2019-2024, EV sales accelerated at 101% CAGR, thus restricting the drop in overall industry sales.

Even going ahead, the furthering electrification is estimated to provide the much-needed thrust to the industry growth over the long term horizon. (EVs have been covered in detail in the next chapter)

EV retail sales trend in India

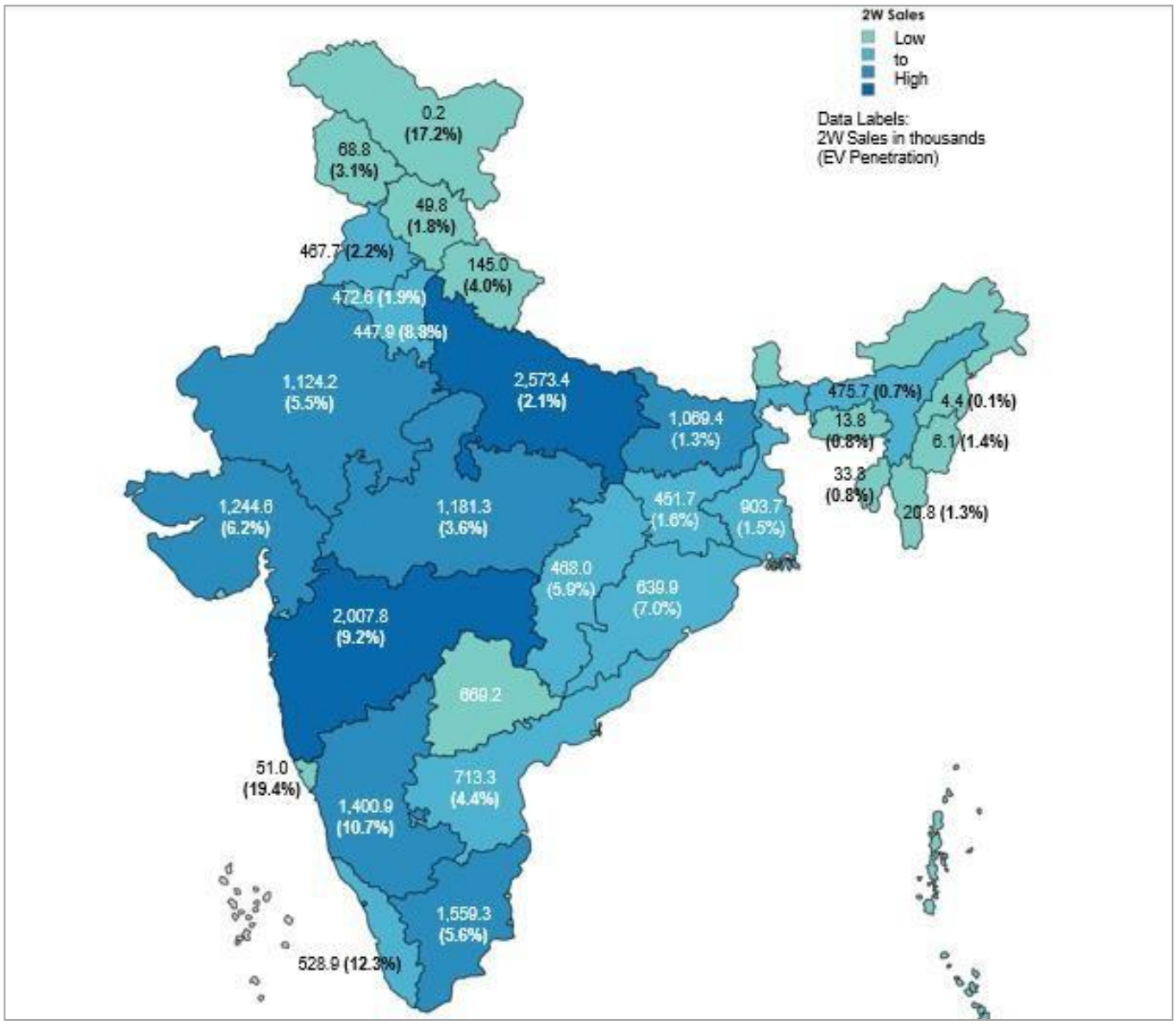


Note: VAHAN data does not include Telangana & Lakshadweep retails
Source: VAHAN, CRISIL MI&A

State wise two-wheeler sales and EV penetration for fiscal 2024

The below graph showcases EV penetration and 2W sales by states. As per the graph, states like Karnataka, Maharashtra, Goa, and Kerala have highest e2W penetration. While states like UP, Gujarat, Bihar, Rajasthan, Madhya Pradesh and Tamil Nadu have higher 2W sales, their EV penetration is relatively lower.

Eastern states including the seven sisters, West Bengal and Jharkhand have very low EV penetration between 0-2%. Northern states like Punjab, Himachal Pradesh, Uttarakhand, and Jammu Kashmir also have low EV penetration in the range of 2-4%.



Source: SIAM for 2W sales, Vahan for e2W retails
Note: Vahan data does not include Telangana EV retails

Shrinking replacement cycles

Amidst the expanding vehicle portfolio, entry of newer players into the industry- global & non- traditional - increasing number of attractive, feature rich and competitively priced vehicle launches, shortening duration of new vehicle launches by OEMs, continuous technological advancement in vehicles, advanced state of the art vehicle launches, younger buyer demographic, expanding financing coverage and rising awareness, the vehicle replacement cycles have been shrinking. The increasing share of scooters with a relatively lower ownership holding period is another factor contributing to the shortening of the replacement cycle. Rising premiumization as well as electrification is also aiding this trend.

From an average 10-12 years replacement cycle a decade ago, the replacement cycles have come down to 7-8 years.

The shortened replacement cycle for the average customer is an added boost for the two-wheeler industry sales.

R&D support

The customer base of the two-wheeler industry has shifted towards the young, tech savvy gen Z customers who appreciate and prefer the latest state of the art features, attractive designs and colours, connected technology as well as hi tech accessories for their new vehicles. This customer base sees the vehicle as an extension of their personality.

Moreover, as the replacement cycles have shorted, the intermittent new vehicle launches are a must to ensure continued demand.

Thus, all the OEMs spend a notable amount on Research and Development (R&D) for the latest tech, design, and features for the upcoming vehicles. R&D has also become a necessity to analyse the safety of the two-wheeler riders.

In the last 6 years, two-wheeler industry OEMs have spent ~2% of their annual operating incomes on their Research and Development expenditure.

Advancement in Vehicle Technology:Over the years, there has been a significant advancement in vehicle technology as well as addition of latest features in ICE as well as EVs, making the vehicles more appealing to the customers, especially the younger buyers. EV segment has revolutionised the industry in terms of latest technological designs as well as offerings, and ICE vehicles are following with notable advancements. The latest new age vehicles offer a wide range of features and innovations to cater to different consumer needs offering safer, more efficient, and environmentally friendly transportation.

In recent two wheelers, features such as digital instrument cluster (around 2010), navigation (around 2017), USB charging port (2017), Bluetooth connectivity (2018), cruise control have been added over the years. Over and above these basic features, premium vehicles including EVs offer much advanced features like full colour TFT displays, gear shift indicators, real time mileage, fuel efficiency metrics, music, calls on vehicle display, riding modes, traction control, keyless ignition, smart helmets with built in communication, heads up display etc.

As technology continues to advance, two-wheeler industry will witness more innovations in the coming years, making the ride safer and more enjoyable for the customer, thereby supporting the growth of industry over the long-term horizon.

Accessories supporting OEM margins

Over the years, companies have expanded the offerings in terms of company branded accessories and merchandise like scooter covers, handlebar pads, engine guard, backrest, helmets, apparels, gloves etc. Such branded accessories form an integral part of the two-wheeler industry. The merchandise is more common for the premium models of the OEMs and form a sizeable portion of the revenue for OEMs.

Today EV manufacturers also offer accessories and merchandise for their customers including smart helmets, portable chargers, fast chargers, pressure monitors etc. EV manufacturers also offer merchandise for their customer base including T shirts, jackets etc.

These accessories and merchandise products are high margin (25-30%) products for the OEMs which not only promote the brand but also provide an added support to the company top line as well as bottom line.

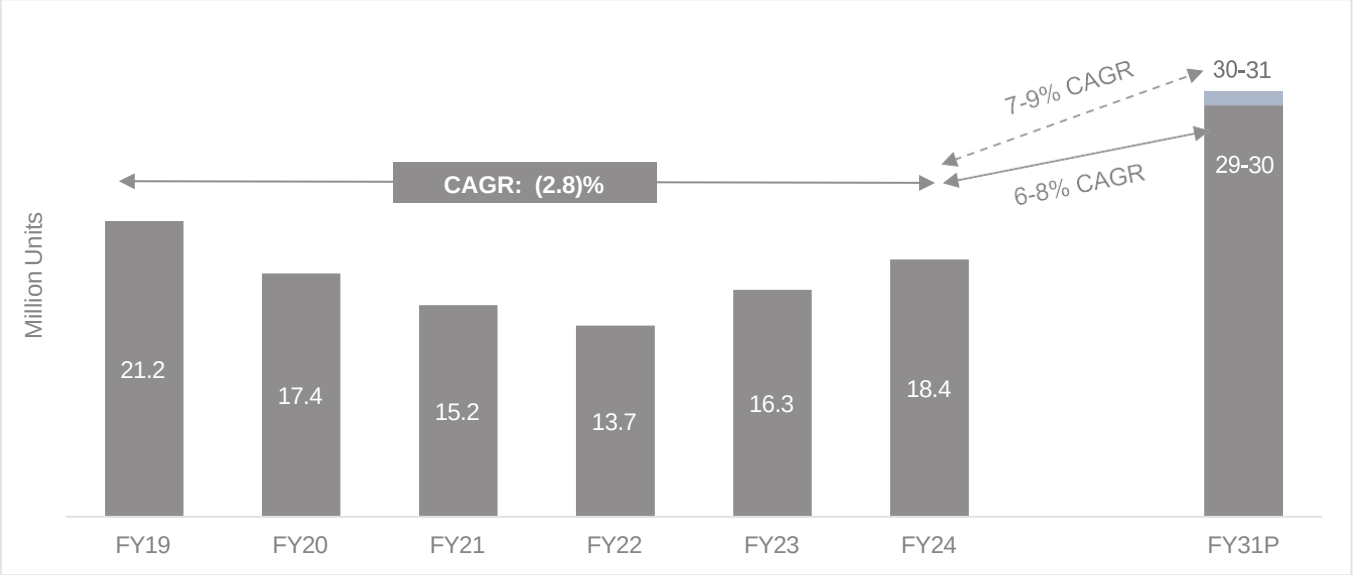
Two Wheeler Industry Outlook (fiscals 2025-2031)

The industry is expected to continue its growth momentum over the long-term horizon led by the positive microeconomic and macroeconomic environment, favourable rural demand, premiumization, intermittent launches, shrinking holding period and continued support from financers. Moreover, continued R&D investments by the OEMs and the technological advancements in the industry to provide an added support to the growth of the industry over the long term horizon.
Additionally, the fast-rising EV segment, with EV portfolio expansion by legacy players, capacity expansion by new age players will accelerate the industry growth.

Introduction of CNG powertrain, which will offer lower operating costs compared to petrol variants, will push the two-wheeler industry growth further.

Led by these positive industry drivers, the two-wheeler industry sales are projected to grow at 6-8% CAGR and reach volumes of 29-30 million by fiscal 2031.

Domestic two-wheeler industry outlook – till fiscal 2031



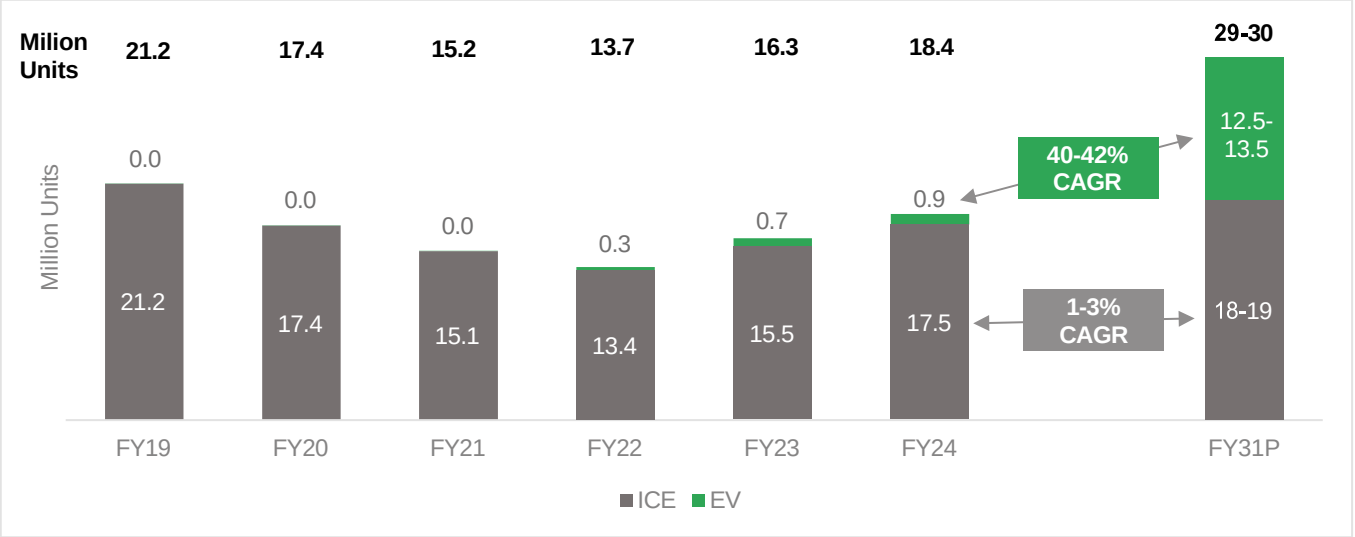
Note: The numbers indicated by the dotted arrow represent the optimistic case
Source: SIAM, CRISIL MI&A

Industry growth will be driven by the EV segment which is projected to clock a healthy CAGR of 40-42% over the long term. While the ICE vehicle segment will grow at a subdued pace of 1-3% CAGR.

The faster growth in EVs will help the EV penetration to reach 28-30% of the industry sales by fiscal 2029 and 33-37% of the industry sales by fiscal 2031. (EV subsegment outlook is covered in detail in the later section)

In an optimistic scenario, supported by increased EV launches, favourable government support, faster momentum in infrastructure development, reduced battery prices, easing supply chain constraints, localized value chain and faster consumer shift towards electrification, the industry sales are projected to grow at a faster pace of 7-9% CAGR to reach volumes of 30-31 million by fiscal 2031. In the optimistic scenario, EV penetration is expected to reach 38-42% compared to 33-37% estimated for the base case.

Domestic two-wheeler industry powertrain wise outlook

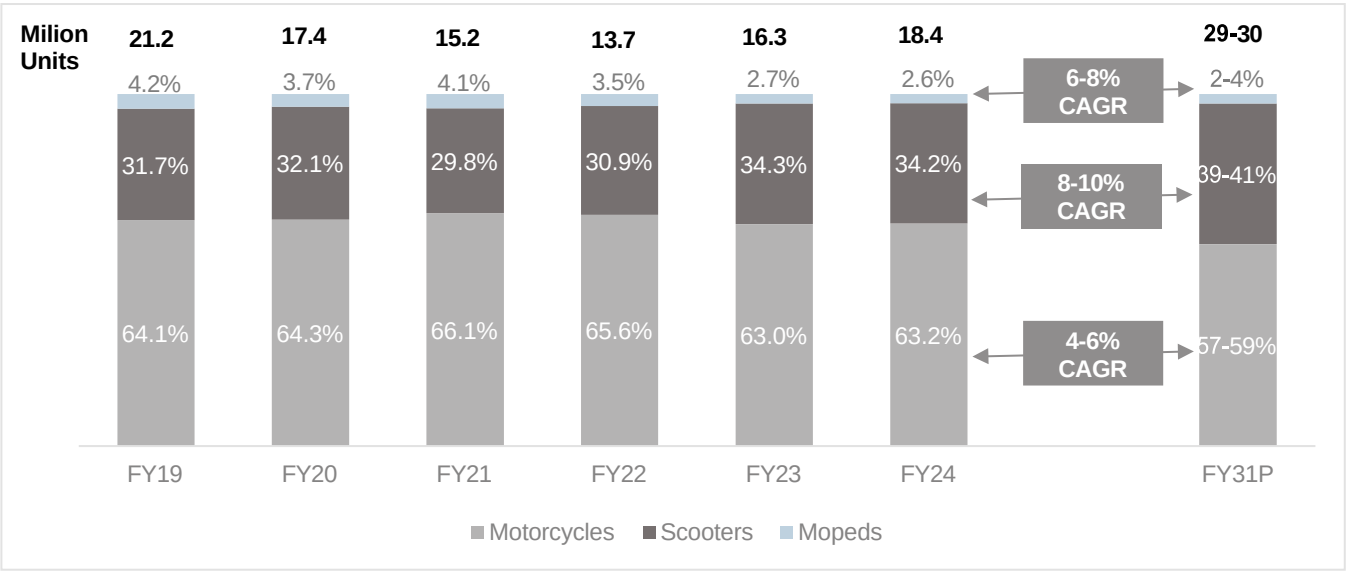


Note: Figures above the graph showcase the total sales, outlook is for the base case scenario
Source: SIAM, CRISIL MI&A

Going ahead, over the long term horizon, CRISIL MI&A expects the scooter segment to grow at a much faster pace off the relatively lower base, backed by expected sharp rise in e-scooter demand, ubiquitous usage of scooters, rising share of women in workforce, projected growth of e commerce segment coupled with continued focus of OEMs on the scooters segment. The strong launch pipeline, especially for e-scooters and faster replacement cycles of the scooters segment will also back the faster growth of the scooters segment. Further, the improvement in supporting charging infrastructure is expected to provide added impetus to the segment's growth.

CRISIL MI&A projects the scooters segment to grow at a faster pace of 8-10% CAGR over the long-term horizon. However, the ICE scooters segment is expected to contract amidst the shift towards the EV segment. Sizeable portion of the ICE scooter replacement demand will shift towards the electric variants.

Segmental Split Outlook



Source: SIAM, CRISIL MI&A

Motorcycles, on the other hand, are projected to grow at a slower pace of 4-6% CAGR over the long term horizon- till fiscal 2031. The primary contributor to motorcycle sales, the ICE motorcycles are expected to grow at 3-5% CAGR. The premium >=125cc subsegments are expected to continue to provide the thrust to the motorcycles segment going ahead while the <=110cc subsegment is projected to grow at only a moderate pace. Premiumization and upgradation will limit the growth of <=110cc motorcycles subsegment

Mopeds are expected to grow almost in line with the overall industry growth led by the electrification in the price sensitive segment. Electrification within the mopeds segment will lead the growth of this segment. CRISIL MI&A expects the relatively financially weak, bottom of the pyramid customer base of mopeds segment to opt for EV mopeds which have relatively lower acquisition costs.

There is only one model, the recently launched E luna, currently present in the mopeds segment, however, launch of more models are expected in the short term which will revive the growth of this contracting segment.

Segmental growth within the industry in the last 5 years

Segment	FY19-FY24 CAGR	FY24-FY31P CAGR
Motorcycles	**(3.0) %**	**4-6%**
ICE	(3.1) %	3-5%
EV	NM	107-109%
Scooters	**(1.3) %**	**8-10%**
ICE	(4.3) %	(7)-(8) %
EV	101.3%	35-37%
Mopeds	**(11.4) %**	**6-8%**
ICE	(11.4) %	(21)- (19) %
EV	NM	NM
Total	**(2.8) %**	**6-8%**

Note: NM: Not meaningful; Figures in bracket to be read as negative (E.g. (10) to be read as minus 10), EV retail data from VAHAN has been considered.
Source: SIAM, CRISIL MI&A

Exports

In the last six years, between fiscal 2019-2024, two-wheeler industry exports rose at a moderate pace of 1% reaching volumes of 3.5 million in fiscal 2024. Currently exports account for 15-20% of the overall two-wheeler sales in India.

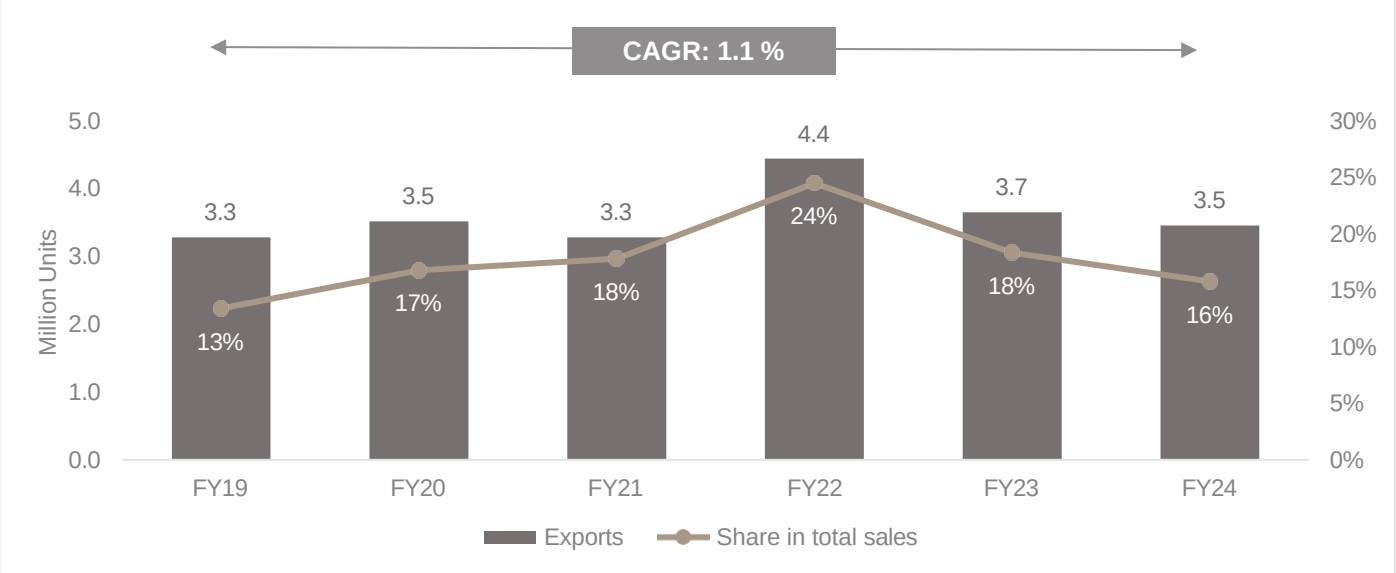
Growth in exports was led by increase in global demand as well as geographical expansion by players like Bajaj and TVS. Also, joint ventures with global brands—such as KTM, Husqvarna and BMW—and catering to the global demand of these brands from India has given an additional thrust to two-wheeler exports.

However, exports from India were limited by recent global fiscal tightening measures, increased inflation levels, as well as forex unavailability. Over and above this, geopolitical conflicts have been impacting the exports demand.

In the last 6 years, exports have remained near steady at around volumes of 3.5 million with fiscal 2022 being an exceptional year for exports. Exports rose at a healthy pace in fiscal 2022 led by the increased focus of OEMs on exports amidst a slowdown in the domestic market. The export levels normalised in fiscal 2023, with increased demand from domestic markets. Its share in overall industry sales also regularized to normal 15-20% range.

During fiscal 2024, two-wheeler industry exports dropped by 5% further amidst continued focus on rising domestic market and slowdown in demand from major contributing geographies of Africa and Asia.

Two-wheeler exports trend



Source: SIAM, CRISIL MI&A

Two wheelers are primarily exported to developing countries from India with Africa contributing the major share. However, exports to Africa have been under pressure amidst the slowdown in their economy, sharp rise in inflation levels and unavailability of forex in Nigeria, the leading two-wheeler importer from India. Contribution of Africa has reduced from 44% in fiscal 2023 to 41% in fiscal 2024 (Apr 2023-Feb 2024).

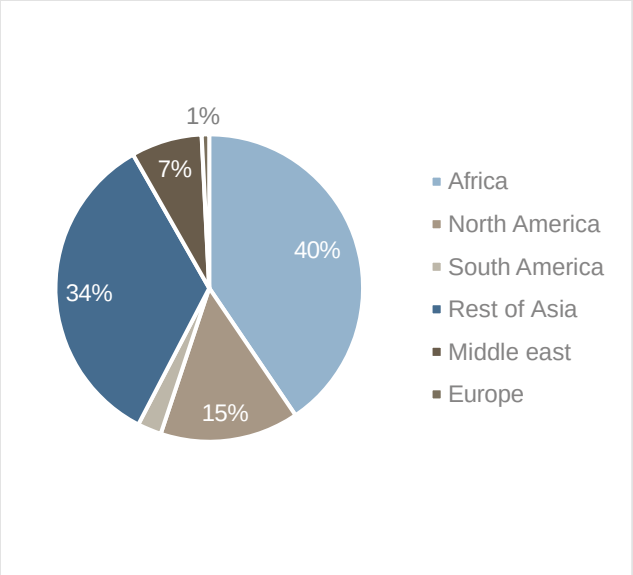
Increased exports to North American countries (6% y-o-y increase in share), primarily Mexico, has lent some support to exports during fiscal 2024. Increase in exports to Turkey aided the share of Middle East during the year. Given the FTAs with Middle Eastern countries like Saudi Arabia and UAE, the exports to middle eastern countries have been on the rise.

India also exports a sizeable portion to Southeast Asian countries like Philippines, Indonesia, Taiwan as well as neighbouring countries of Nepal and Bangladesh. Share of exports to neighbouring countries has also contracted in fiscal 2024 due to the economic problems Nepal and Bangladesh. Continued exports to Indonesia have restricted the loss of share.

Scooters have witnessed higher acceptance in South Asian markets like Thailand, Malaysia, Vietnam, Indonesia and are widely favoured for their affordability, fuel efficiency, and agility in navigating congested roads. These developing nations have limited per capita incomes making passenger vehicles unaffordable for a significant customer base. Moreover, scooters are favoured for their ability as a family vehicle which can be used in urban and rural areas for the daily commute as well as to haul small luggage to and from the market.

Additionally, the respective governments are also incentivising purchase of low emission and technologically advanced vehicles which align with environmental and safety goals set by the government.

Geographical split for Indian two-wheeler exports volumes (Fiscal 2024)



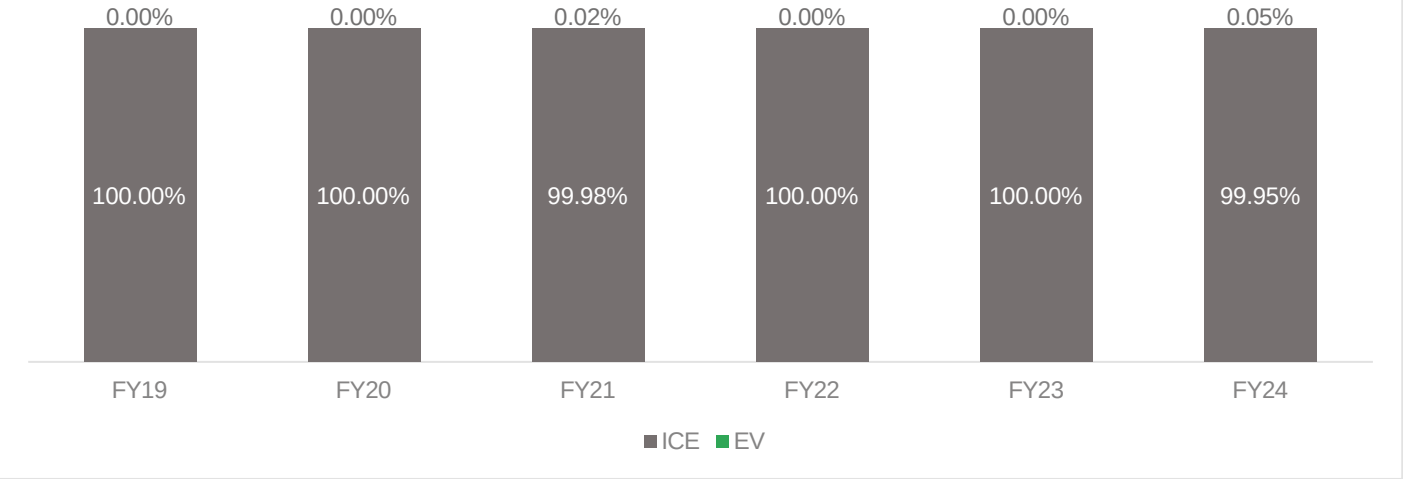
Country	Share in fiscal 2024
Nigeria	13.3%
Mexico	8.1%
Columbia	7.9%
Guatemala	5.0%
Guinea	4.8%
Philippines	4.8%
Uganda	4.6%
Turkey	4.5%
Tanzania	4.0%
Nepal	3.7%

Note: Rest of Asia: Entire Asia except Middle East
Source: Ministry of Commerce and Industry, CRISIL MI&A

ICE two-wheelers completely dominate the exports. However, in line with electrification in the domestic two-wheeler market, OEMs have started exporting EVs from India in the last 3 years. In fact, in fiscal 2024, EV exports rose 19x compared to EV exports in fiscal 2023.

As of fiscal 2024, TVS, OLA and Ather are primarily exporting EVs from India. The EV exports are currently at a nascent stage, however, are expected to grow going ahead.

Powertrain Split within two-wheeler exports



Segment wise exports trend

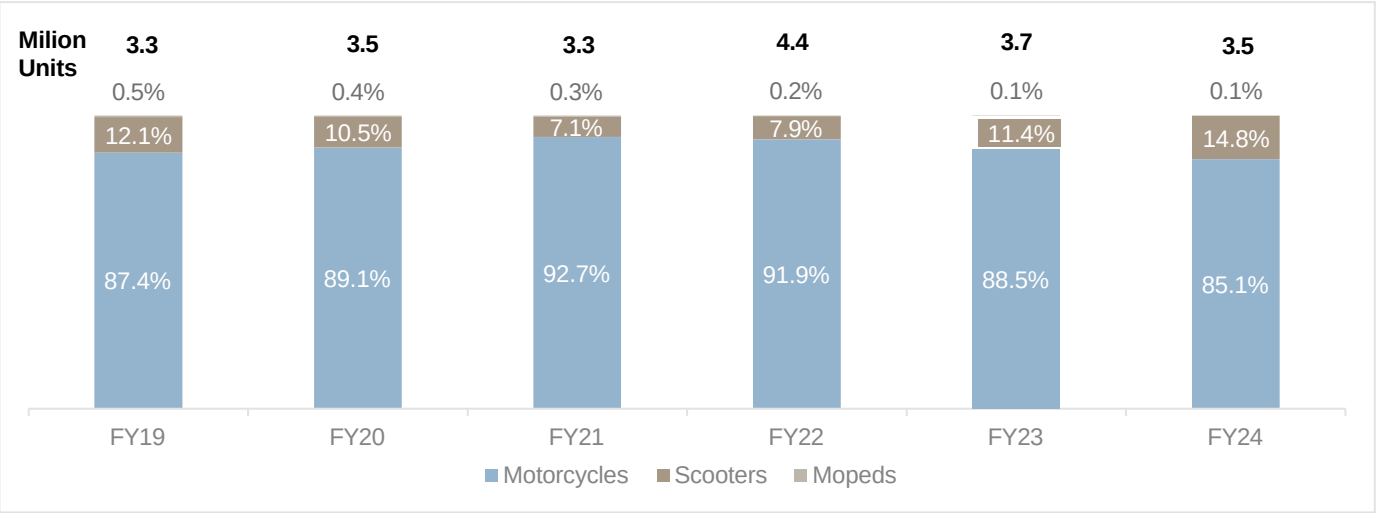
Motorcycles dominate the exports segment as well with more than 85% share in overall exports. However, they lost some ground to scooters, especially in the last 3 years.

Motorcycle exports grew at a modest pace of 1% CAGR during fiscal 2019-2024 while scooters clocked a faster 5% CAGR during the same period, albeit from a smaller base. Increased push from HMSI as well as TVS with further geographical expansion in Latin American and South East Asian countries aided the faster growth of scooter exports.

Even in fiscal 2024, while the exports of motorcycles contracted by 9%, scooter exports rose nearly 23% year-on-year, restricting the overall contraction of exports.

Mopeds form an insignificant part of the two-wheeler exports. Their share contracted further in the last 6 years with a 30% CAGR drop in exports during fiscal 2019-2024 period.

Segmental split within exports



Source: SIAM, CRISIL MI&A

Exports Competitive Landscape

Bajaj is the leading contributor in the two-wheeler exports. Company has dominant 50%+ share in the motorcycle exports-the primary exports segment. However, with rising share of scooters in overall exports coupled with intensified competition within motorcycle exports, Bajaj lost some ground in the last 5 years. However, with continued demand for its Pulsar, Boxer, Dominar and KTM models coupled with increased support from Triumph branded motorcycles, Bajaj has maintained its numero uno position in motorcycles as well as overall industry exports.

The second largest contributor TVS has gained further ground in motorcycles as well as scooters segment exports during fiscal 2019-2024 period led by the expansion in its exports portfolio as well as geographical expansion. Added exports for recently launched popular vehicles like Raider and Ronin as well as continued exports traction for its models like Star City and Apache helped TVS increase its presence in motorcycles exports. Significant growth in Jupiter and premium scooter Ntorq aided company's expansion in scooters segment. However, the contraction in moped exports restricted TVS' market share growth in exports.

HMSI faced intense competition within scooters segment limiting its contribution in overall two-wheeler exports. However, despite the loss of market share, HMSI continued to lead the scooters segment exports supported by healthy demand for its Activa & Navi models and added support from recently launched Dio125.

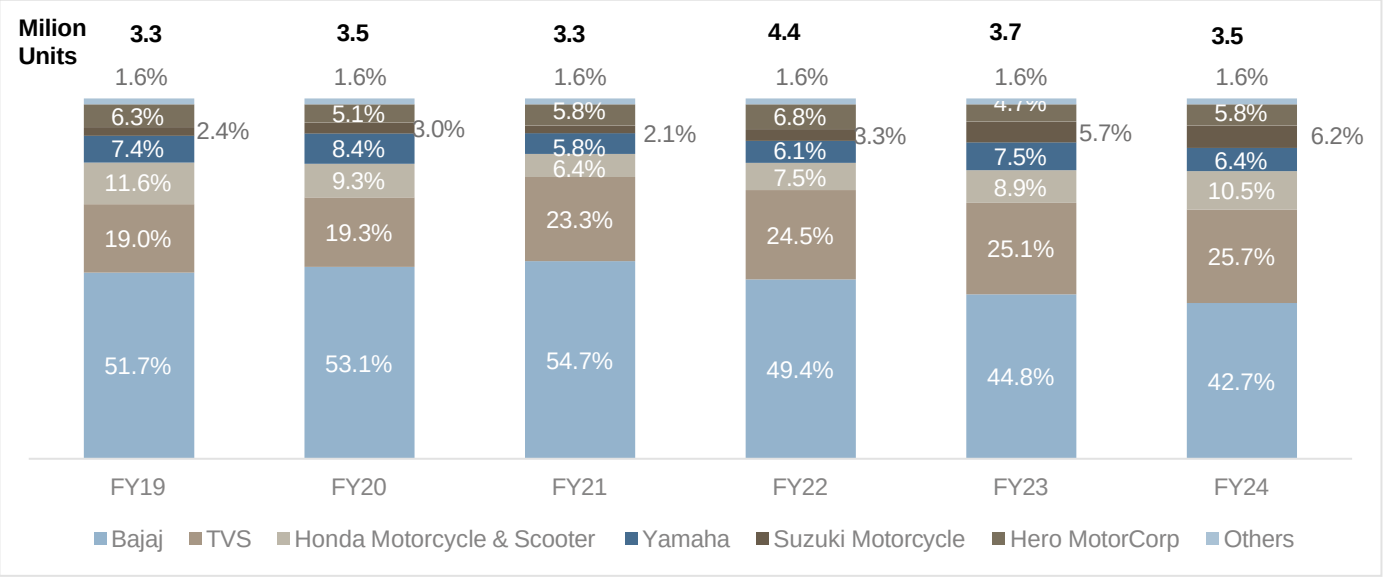
Increased traction for its premium scooters of Burgman and Avenis backed Suzuki's expansion in scooter exports and thus aiding its share expansion in overall two-wheeler exports as well. Moreover, Gixxer and Vstrom helped increased motorcycles exports for the company.

Continued exports of its popular models FZ and RayZR range supported the exports contribution for Yamaha. The company has successfully maintained its 5-7% share in two-wheeler exports in the last 5 years.

In addition to the continued demand for its Classic 350, Himalayan; recent launches like Hunter and Meteor provided an added support to RE exports. And its share within two-wheeler exports increased from 0.6% in fiscal 2019 to 2.3% in fiscal 2024.

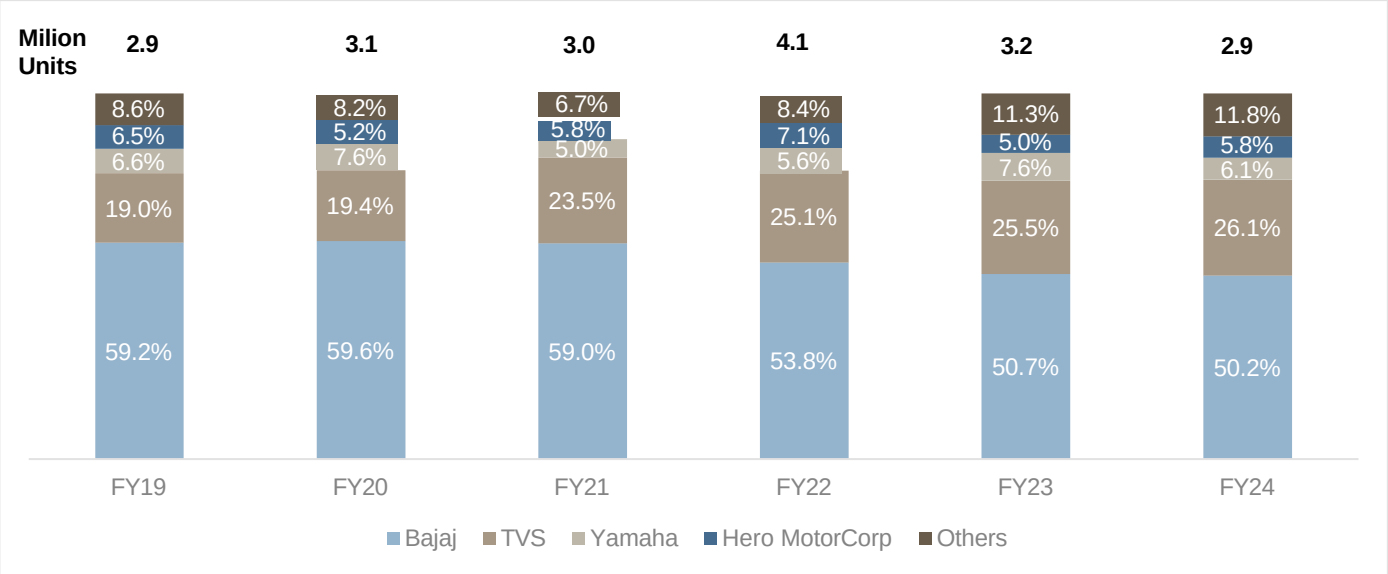
Contribution of HMCL is limited in the exports market and has remained near steady in 5-6% range.

OEM wise share in two-wheeler exports



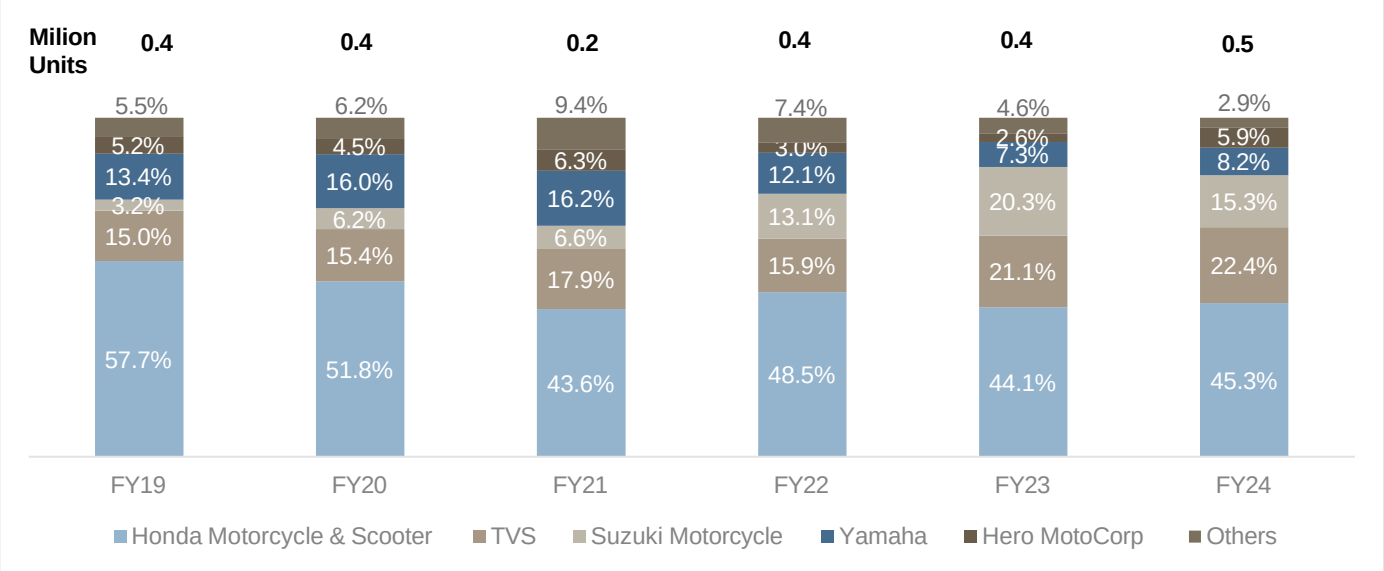
Source: SIAM, CRISIL MI&A

OEM wise share in Motorcycle exports



Source: SIAM, CRISIL MI&A

OEM wise share in Scooter exports



Source: SIAM, CRISIL MI&A

Exports Outlook

Two-wheeler exports from India grew at a moderate pace of 1.1% CAGR during fiscal 2019 to fiscal 2024. Going ahead, CRISIL MI&A expects the industry growth to grow at a faster pace of 3-5% CAGR to reach 4.5-5 million levels by fiscal 2031.

This growth will be propelled by continued improvement in macro-economic environment in exports destinations, expansion in geographical coverage by the OEMs as well as the expansion in vehicle portfolio for exports.

Moreover, going ahead, the fast-growing EV segment is expected to contribute meaningfully to exports as well amidst the capacity expansion by the players, increasing focus on exports market, and sharp rise in EV portfolio.

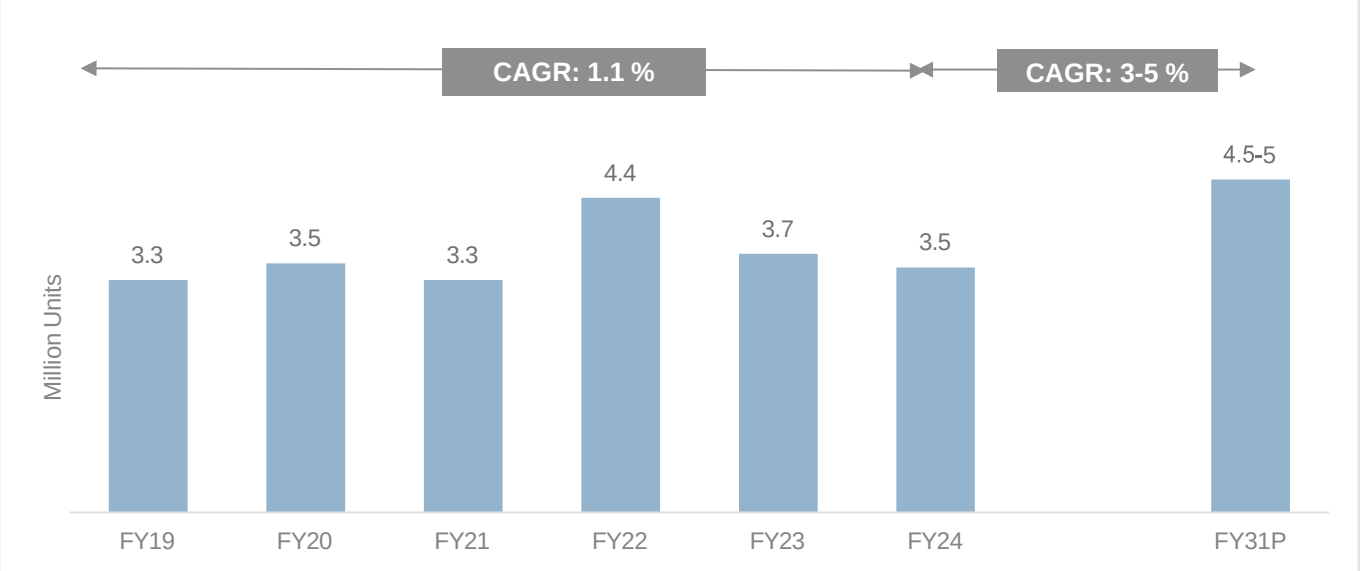
India being one of the largest two-wheeler domestic markets globally, has a unique opportunity to leverage its domestic market scale and manufacturing competitiveness to produce electric two-wheelers not just for the domestic market but also for the exports markets. Further, policies including PLI are offering a momentum to domestic OEMs for manufacturing and exporting EVs from India. The government offers incentives through PLI for entire EV ecosystem including automobiles, auto components and ACC batteries.

Additionally, the growing demand for eco-friendly and sustainable transportation options globally is expected to provide the fillip to e-two-wheelers demand going forward. Countries like Nepal, which have a strong dependence on India for their two-wheeler imports, have tall electrification targets (90% EV sales by 2030). These will also aid the e two-wheeler exports demand going ahead. Thus, the rise in EV exports will support the overall two-wheeler industry exports over the long term horizon.

India's economic relations with global economies through different trade agreements would enable Indian OEMs to enhance the exports of automobiles and related components from the country. Recently India has established FTA with several nations including the UAE and Australia. India is also negotiating with the UK and the EU on establishing FTA. FTA agreements will offer immense potential to Indian OEMs, enabling them to tap into a broader customer base and establish India as a key player in the global automotive industry.

None the less, conflicts in the Middle East can have a negative impact on the oil prices, thereby increasing the inflationary pressure in major importing countries and impact exports demand from India in the near term.

Exports Outlook



Source: SIAM, CRISIL MI&A

3. Review of the Indian Passenger Vehicle industry

Review of the Indian domestic PV industry (fiscals 2019 to 2024)

Until liberalisation in 1991, there were only three major car manufacturers in India – Hindustan Motors, Premier and Maruti Suzuki (formerly Maruti Udyog). Maruti and Suzuki's partnership was the country's first Indian-foreign joint venture. Post liberalisation, the home brand Tata Motors entered the passenger vehicle (PV) segment with a series of launches throughout the decade. Another home brand Mahindra, that traditionally manufactured off-roading utility vehicles, also entered the PV space in the late 2000s. Also, major international corporations such as Hyundai and Honda entered the country in late 1990s following gradual implementation of economic reforms, with Hyundai quickly gaining prominent market share. From 2000 to 2010, almost every major car company had also established manufacturing facilities in the country.

Amidst improvement in macro-economic scenario, rising disposable incomes and expanding vehicle portfolios, the Indian PV industry witnessed stellar growth and reached a high of 3.4 million vehicle sales in fiscal 2019. This high growth until fiscal 2019 was led by continuous improvement in GDP, increase in disposable incomes and new model launches, stable cost of vehicle ownership, as well as rising traction for Sports Utility Vehicles (SUVs).

Between fiscals 2019 and 2024, India's domestic PV sales rose at 5% CAGR. This growth was despite the sales contraction (at 10% CAGR) witnessed during fiscals 2019 to 2021. From the low base of fiscal 2021, PV sales bounced back and grew at a healthy pace to reach a historic high of 3.9 million vehicles in fiscal 2023.

In fiscal 2020, contraction of the economy put pressure on vehicle sales. Moreover, the Non-Banking Financial Company (NBFC) liquidity crisis and halting of BS-IV vehicle production amid mandatory implementation of BS-VI norms from fiscal 2021 exerted added pressure during the year. The industry also lost nearly half a month's sales at fiscal year-end owing to outbreak of the Covid-19 pandemic and subsequent nationwide lockdown.

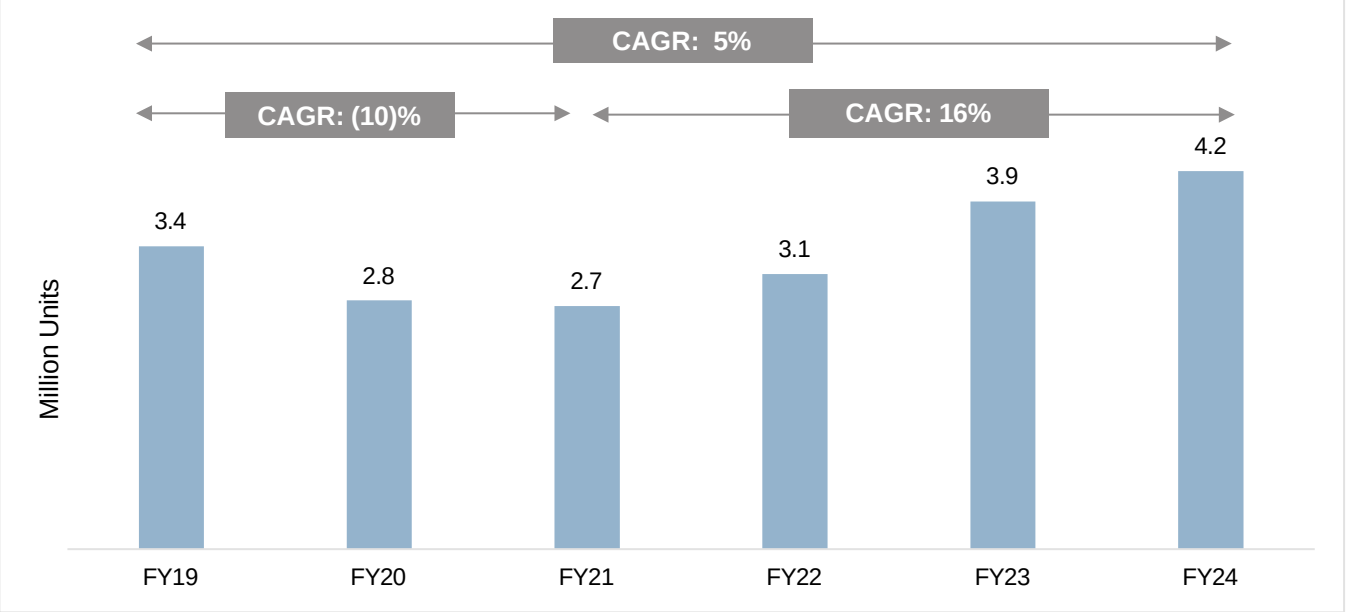
In fiscal 2021, domestic sales continued to be impacted by the first wave of the pandemic. A nationwide lockdown, reduced mobility, and supply chain constraints leading to production cuts weighed on annual sales. Despite some improvement in sales with the reopening of the economy and increased demand for personal mobility during the second half of the year, sales contracted ~2.2% year-on-year owing to the additional price hikes due to implementation of the BS-VI norms.

Fiscal 2022 began with a much severe second wave of Covid-19. State-imposed lockdowns, economic uncertainty, and a global shortage of semiconductor supply caused extended waiting periods that impacted sales, especially in the first half of the year. There was some improvement in the economic scenario with the reopening of markets in the second half of the fiscal. Pent-up vehicle demand, further increased need for personal mobility and improved supply scenario provided thrust to PV sales during the second half. After a two-year consecutive drop, PV sales rose 13% from a very low base of fiscal 2021.

In fiscal 2023, the PV industry grew at a rate of 27% y-o-y, which was more than double the rate of 13% y-o-y witnessed during fiscal 2022, owing to the healthy pent-up demand created by two years of slump in sales volume. The orderbooks of auto OEMs were further supported by several new launches in the growing SUV category, which saw higher traction, along with multiple facelifts of existing models and easing supply of semiconductors. In fact, overall wholesale volume reached a historic high of 3.9 million units in the fiscal.

Historic production development (FY19-FY24)

Review of domestic PV sales volumes



Note: Figures in bracket to be read as negative (Eg. (10) to be read as minus 10)
Source: SIAM, CRISIL MI&A

During fiscal 2024, growth momentum of the industry continued, albeit at a slower pace, backed by the continued traction for the SUV segment, intermittent launches and improvement in disposable income. Off the high base of fiscal 2023, the industry grew 9% in fiscal 2024 to reach the historic high of 4.2 million units.

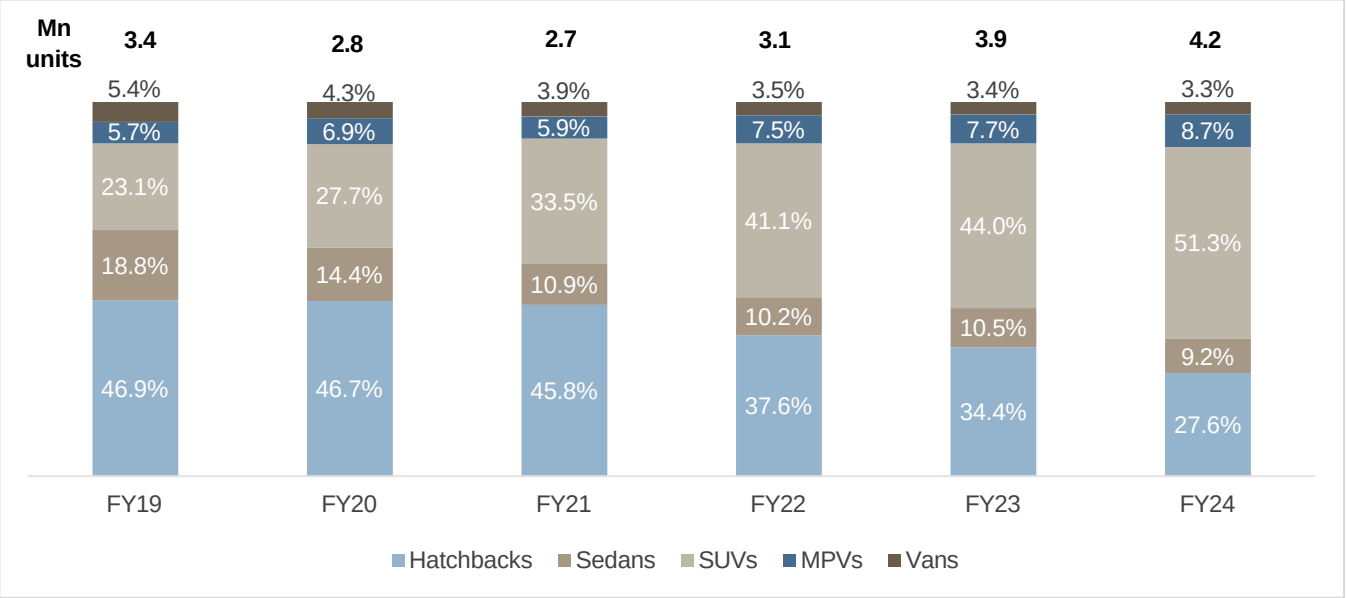
Segmental shifts amidst premiumization

The passenger vehicle industry can be broadly classified basis body types into hatchbacks, sedans, sports utility vehicles (SUVs), multipurpose vehicles (MPVs) and vans. Traditionally, Indian passenger vehicle buyers have been cost conscious, with mileage and initial vehicle buying cost being the two main pillars of decision-making. Thereby, the hatchback segment had been leading PV sales over the years primarily because of the lower ticket size and lower running costs, making them affordable to the average Indian customer.

However, with a growing share of younger buyers who have high global exposure, there is an increasing awareness and preference towards other parameters such as driving experience, safety, advanced features and aesthetics, which are impacting the overall decision-making process. To address this change, OEMs like Tata Motors & Hyundai have showcased enhanced vehicle safety in their recent launches. Several OEMs have also gradually introduced advanced features and trickled them down from their top variants to the mid variants. Furthermore, rising disposable income has also given an impetus to growth in the SUV segment.

There has been a perceptible shift in the customer buying behaviour, where customers are prioritising vehicle experience over costs and are willing to pay a premium and are also ready to accept longer waiting time for the desired vehicle. More and more customers are now opting to buy mid to top level variants that fall within their budgets. This shift towards premium vehicles i.e. premiumisation is resulting in intersegmental as well as intra segmental shifts.

Segment-wise trends in the overall PV sales volumes in India



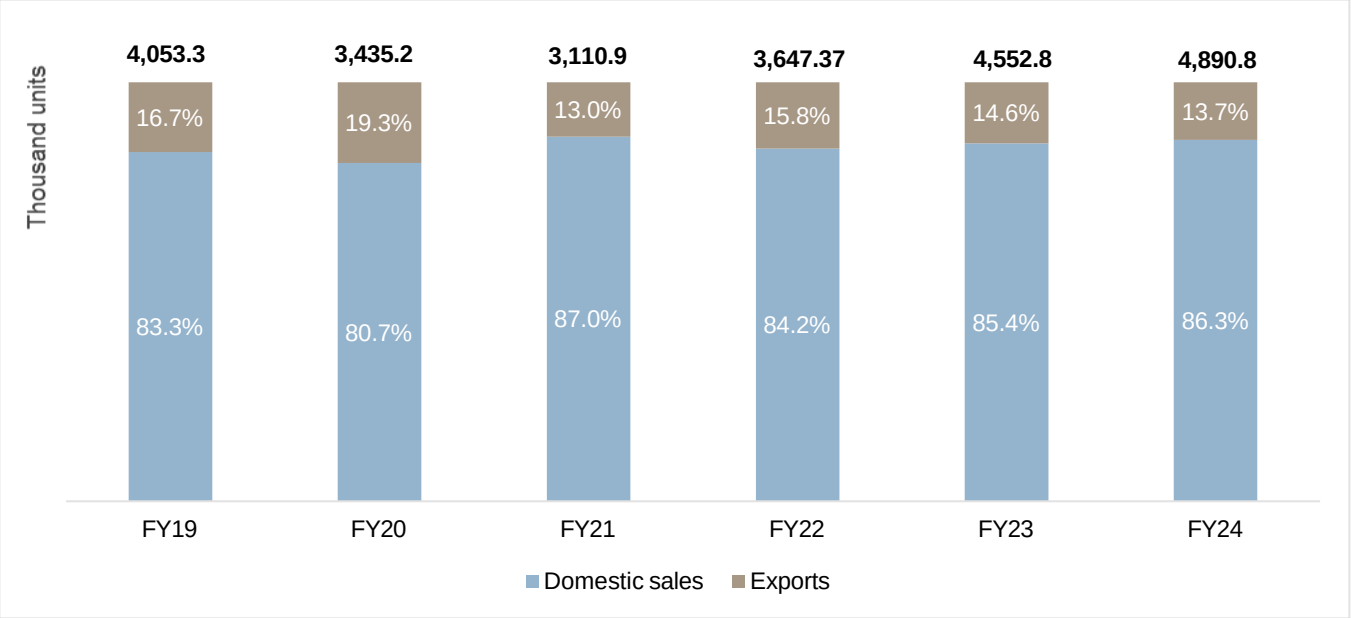
Note: Figures above bars are the sales volumes.
Source: SIAM, CRISIL MI&A

Split of industry by domestic sales and exports

The Indian PV market is largely domestic-focused, with domestic sales being 85.4% of the total sales in fiscal 2023. The share of exports vis-à-vis total sales contracted from 16.8% in fiscal 2019 to 14.6% in 2023. This could be attributed to the moderate growth in the global automobile industry as well as major OEMs focusing on catering to the fast-growing domestic market. Following a ~38.6% year-on-year drop in fiscal 2021, exports improved drastically by 42.9% in fiscal 2022 and 14.7% in fiscal 2023 owing to demand from emerging countries further supported by push from major OEMs.

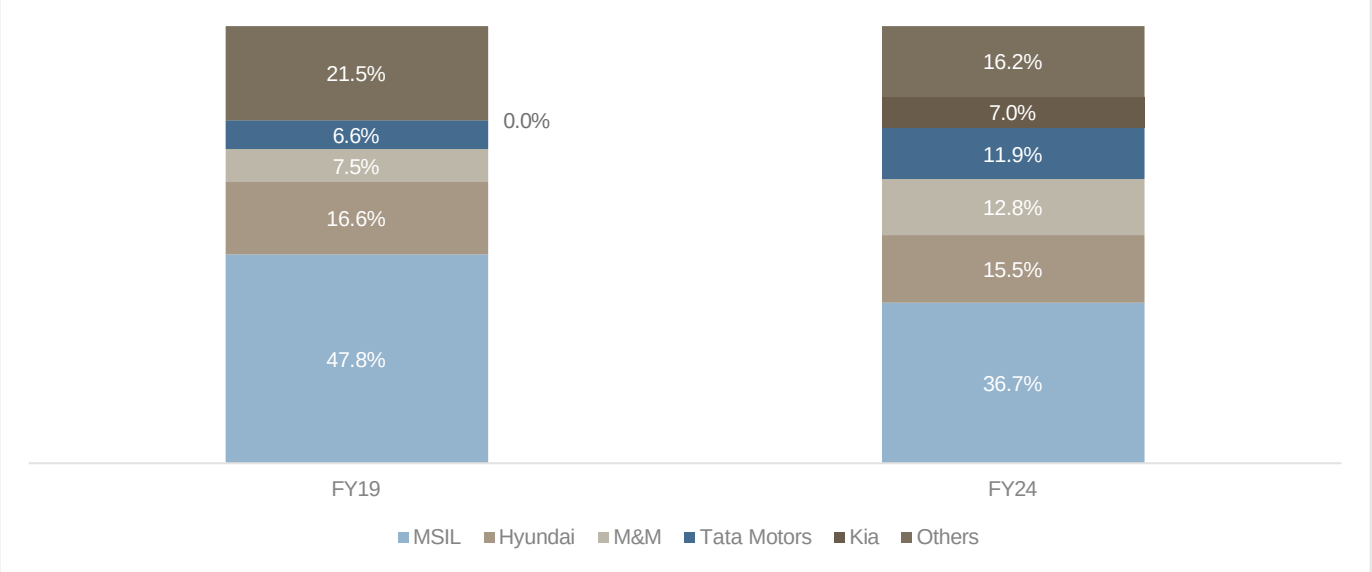
In fiscal 2020, though, the export share had risen to 19% as OEMs refocused on export markets. Stagnating domestic sales over the past three years resulted in foreign automobile manufacturers such as Ford, General Motors, and Volkswagen increasing their focus on exports, thereby improving their capacity utilisation and boosting revenues. These players were utilising India as an export hub, as witnessed by the consistent increase in the proportion of exports to their total production share. However, with the exit of GM and Ford, and impact of COVID-19 and major OEMs prioritising the fast-growing domestic market over foreign markets, the export volumes declined through fiscal 2021. However, the government, through various schemes including PLI, is boosting domestic manufacturing capacity and is offering free access for Indian OEMs to various markets through Free Trade Agreements. These combined with OEMs developing products in-line with global trends is expected to drive the demand for exports going forward.

PV industry share of domestic sales and exports (FY19-FY24)



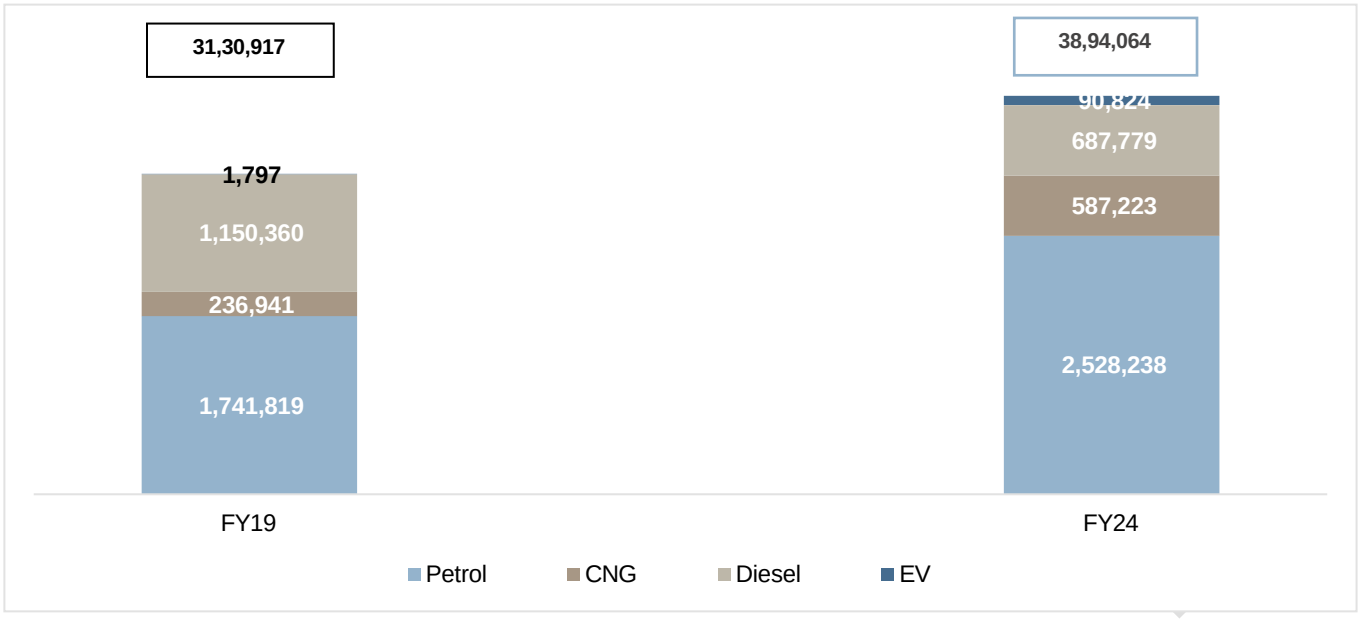
Source: SIAM, CRISIL MI&A

OEM wise split for Conventional Fuel vehicle retails



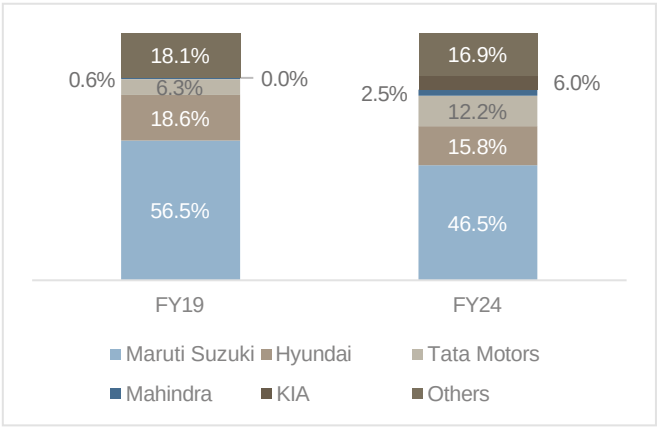
Source: VAHAN, CRISIL MI&A

Fuel wise split for vehicle retails

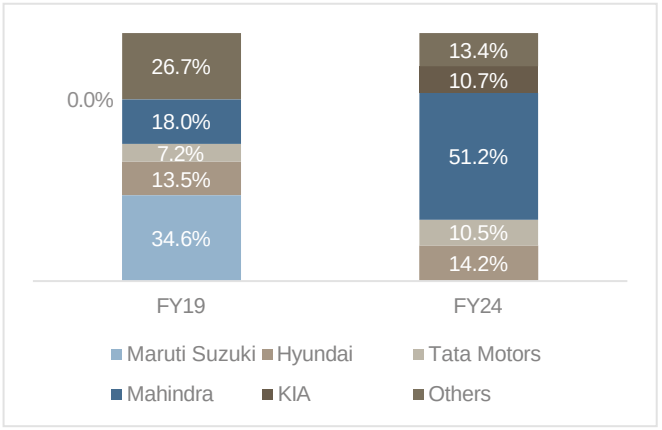


Source: VAHAN, CRISIL MI&A

OEM wise split for Petrol vehicle retails

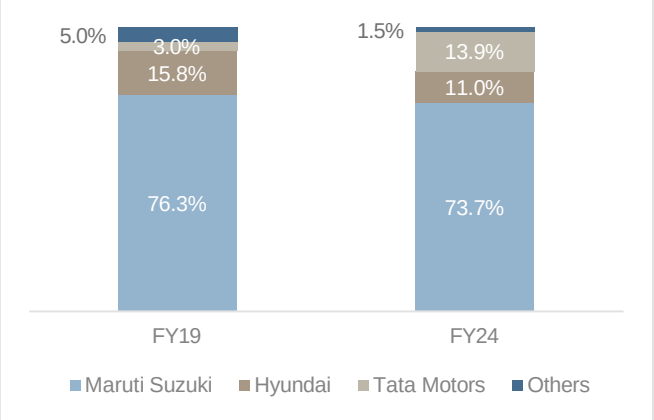


OEM wise split for Diesel vehicle retails

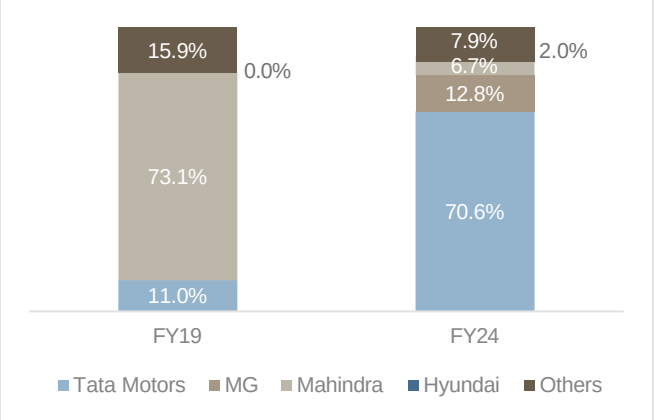


Source: VAHAN, CRISIL MI&A

OEM wise split for CNG vehicle retails



OEM wise split for EV retails



Source: VAHAN, CRISIL MI&A

The share of CNG vehicles in the entire industry retails has more than doubled in the last 5 years to 15% in fiscal 2024. CNG vehicles were primarily preferred for the commercial (taxi) segment, limiting their contribution to a 6-8% range. However, there has been an increase in the CNG portfolio especially in the last 2/3 years. CNG powertrain options were introduced in premium hatchbacks and SUVs (Exter, Punch, Brezza, Fronx, Altroz, Baleno, etc.) due to the rising acceptance of CNG from the personal vehicle buyers. This has thrusted the share of CNG powertrain in the last 2 years. Its contribution rose from 8% in fiscal 2022 to 15% in fiscal 2024. Additionally, the reduction in CNG fuel price post the Kirit Parikh panel recommendation provided an added boost to the CNG sales during fiscal 2024.

The recently emerged EV segment also expanded its presence especially in the last 3 years backed by launch of EV models, expanding charging infrastructure as well as rising climate consciousness. The share of electric vehicles in the overall retails increased from 0.1% in fiscal 2019 to 2.3% in fiscal 2024. (The EV segment is covered in detail below).

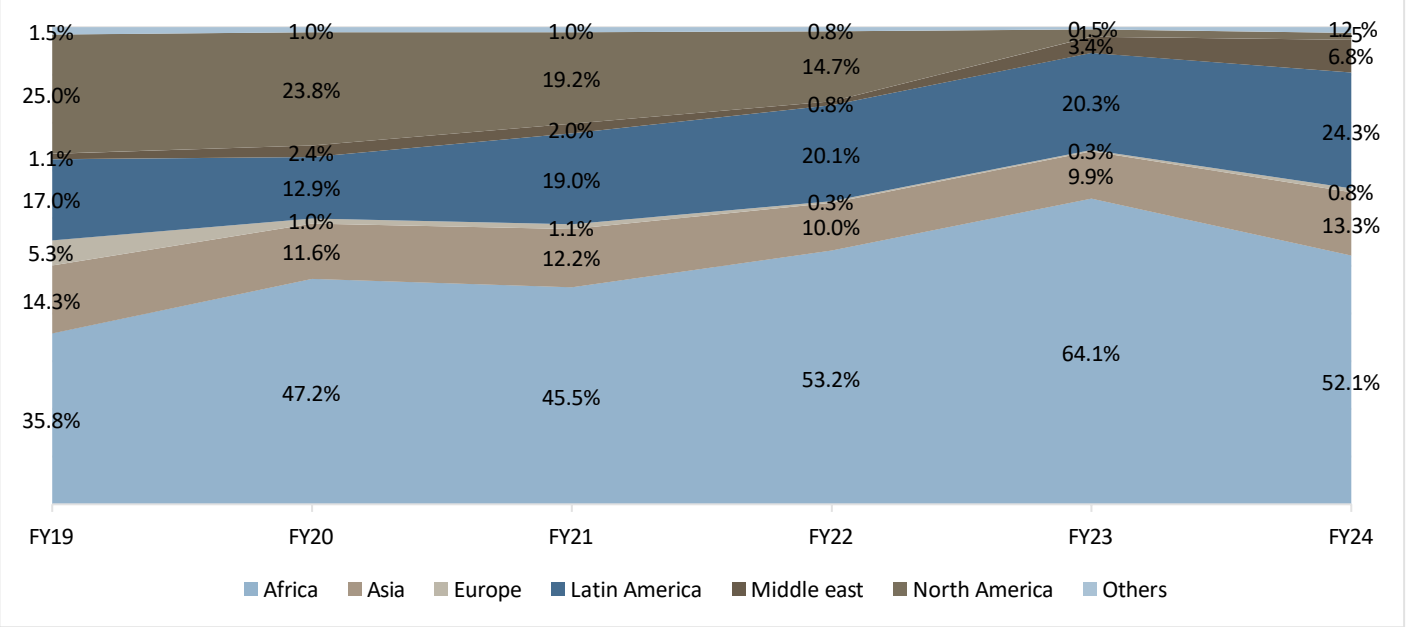
The recent launch of strong hybrid variants for a few models like the Maruti Suzuki Grand Vitara, Toyota Innova Hycross and Honda City has introduced an additional powertrain option for the Indian consumers. Strong hybrid powertrain witnessed healthy traction from consumers looking for increased mileage at relatively limited higher acquisition costs. Lower operating costs, environmental benefits, and relief from uncertainties faced by EV customers like range anxiety or charging station accessibility, have provided a boost to the strong hybrid vehicle retails in the last 2 years.

Review of key export destinations

PV manufacturers from India have grown a stable base in African and Latin American countries over the years owing to good brand recognition of Indian brands for entry level cars. Share of exports to Africa increased to 64% in fiscal 2023 from ~36% in fiscal 2019. South Africa, Tunisia and Angola are the key export destinations within Africa. The share of exports to Latin America also increased in the same period from 17% to 20% due to the increased focus on economies like Mexico, Chile, and Peru. Other top export destinations include Saudi Arabia in the Middle East and Philippines & Indonesia in Asia. Exports to North America have decreased gradually in the past five years. This is primarily due to the quitting of American automakers like GM and Ford from India.

Trade tensions between China and other developed economies including US and Europe coupled with initiatives taken by these countries to diversify their supply chain through various strategies could bring additional attention to export hubs like India. This would offer opportunity for domestic car makers to expand their export reach leveraging government support through various initiatives like FTA, PLI and PMP schemes.

Key export destinations, by region (FY19-FY24)



Source: DGFT, CRISIL MI&A

Future growth drivers for the exports market

While predominantly a small-car exporter, India has strongly emerged as an exporter of midsize sedans and UVs with a growing acceptance of vehicles manufactured in India. As a percentage of overall exports in PV, the cars segment share reduced to 62% in fiscal 2023 from 76% in fiscal 2019. Consequently, the share of UVs increased to 37% from 23%.

Africa occupies the highest proportion in PV exports from India, followed by Latin America. Indian OEMs have diversified their exports by exploring newer geographies. New markets such as Saudi Arabia, the United Arab Emirates and South Africa have shown significant demand growth.

Below factors are likely to support growth of PV exports from India:

- Capacity expansion by top players
- Stable crude oil prices to aid demand from African and Latin American geographies.
- Continued expansion into newer markets
- PLI scheme

Competitive landscape: OEM wise share

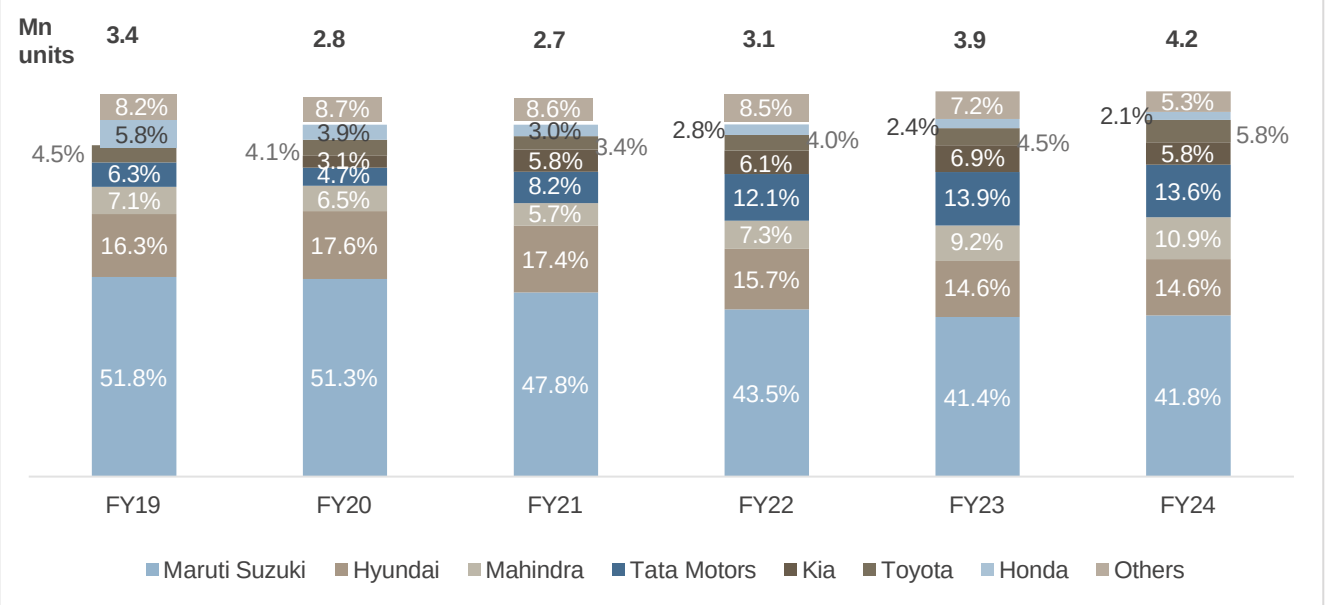
Domestic PV industry is an oligopolistic market with few players dominating the entire industry. Maruti Suzuki leads the PV industry in terms of domestic sales volumes. Hyundai is the second largest contributor to the domestic sales, closely followed by Tata Motors and Mahindra. These 4 players together contribute ~80% of the market.

However, in the last 5 years, the competition has intensified amidst competitively priced feature-rich vehicle launches by all players as well as recent entrants such as Kia and MG grabbing sizeable shares.

Share of Maruti Suzuki has contracted from a high base of 52% in fiscal 2019 to 43% in fiscal 2024 due to the shift in customer preference from hatchbacks towards SUVs and Maruti Suzuki's focus on the cars segment. However, success of their recent launches like Maruti Suzuki Grand Vitara, Maruti Suzuki Fronx, Maruti Suzuki Invicto and continued traction for Maruti Suzuki Ertiga & Maruti Suzuki Brezza helped Maruti Suzuki regain some lost ground during fiscal 2024.

Hyundai is the second largest contributor to Indian domestic PV sales and has maintained its position in the market. This is due to continued traction for popular SUV models like Creta and Venue coupled with intermittent new vehicle launches and launch of upgrades of its popular models. Introduction of Venue, Aura & Kona helped company expand its presence in the market during fiscal 2020. In the next 4 years, Hyundai maintained 15-18% share within the domestic market amidst continued demand for its popular models aided by intermittent upgrades of its popular models like i10, i20, Creta, Verna & Venue.

PV domestic market share across OEMs



Note: Others include MG, Renault/Nissan, Skoda, PCA etc, FY24 data is for April-Feb period, Figures above bars are the sales volumes.
Source: SIAM- Society of Indian Automobile Manufacturers, CRISIL MI&A

Tata Motors gained ground in the last 5 years riding on the success of its SUV models of Nexon & Punch. The increase in traction for EVs (where Tata Motors dominates) has also provided an additional support to Tata Motors sales. In turn, Tata Motors' share of total market expanded from 6% to 11%, during fiscal 2019-2024 period.

The portfolio expansion in the form of XUV3OO, XUV7OO, Scorpio N has aided Mahindra's share in recent years. In the last 5 years, Mahindra expanded its share from 7% in fiscal 2019 to 11% by 2024.

Recent entrant Kia tasted early success in the Indian market in the form of Seltos & Sonet which helped the company grab a sizeable 6% share of the market by fiscal 2024.

Toyota has maintained its 4-6% market share with continued demand for its flagship Innova. While Glanza, Urban Cruiser and Hyryder provided added support to Toyota's sales.

Honda has been facing intense competition in the domestic market and its share has contracted from 6% in fiscal 2019 to 2% in fiscal 2024(Apr-Feb).

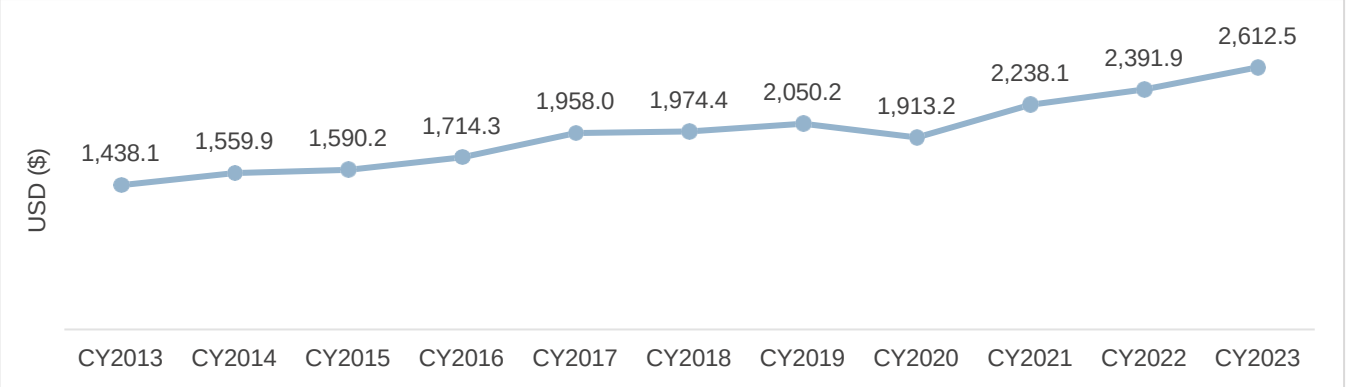
Key historic regulatory/macroeconomic trends and growth drivers for domestic sales

GDP per capita

GDP per capita is Gross Domestic Product (GDP) of a country distributed per person in the population. It is calculated by dividing total GDP by the population. Per capita income shows the increase in income thereby indicating economic well-being and average living standard of population in a country.

India had a GDP per capita of $2,612.5 in 2023 compared to $1,438.1 in 2013. It has increased at a CAGR of 6.2% in the last 10 years. In 2020, the GDP per capita decreased by 6.7% owing to the pandemic and nationwide lockdown which impacted the manufacturing and service sector. However, in 2021 these sectors returned to normalcy and GDP per capita increased by 17.0% to reach $2,238.1. Global dependency on India for production of goods and growing service sector in the country for the past decade has aided this growth. The increase in population along with demand for employment has significantly increased the nation's GDP per capita.

GDP per capita in USD from CY2013-2023



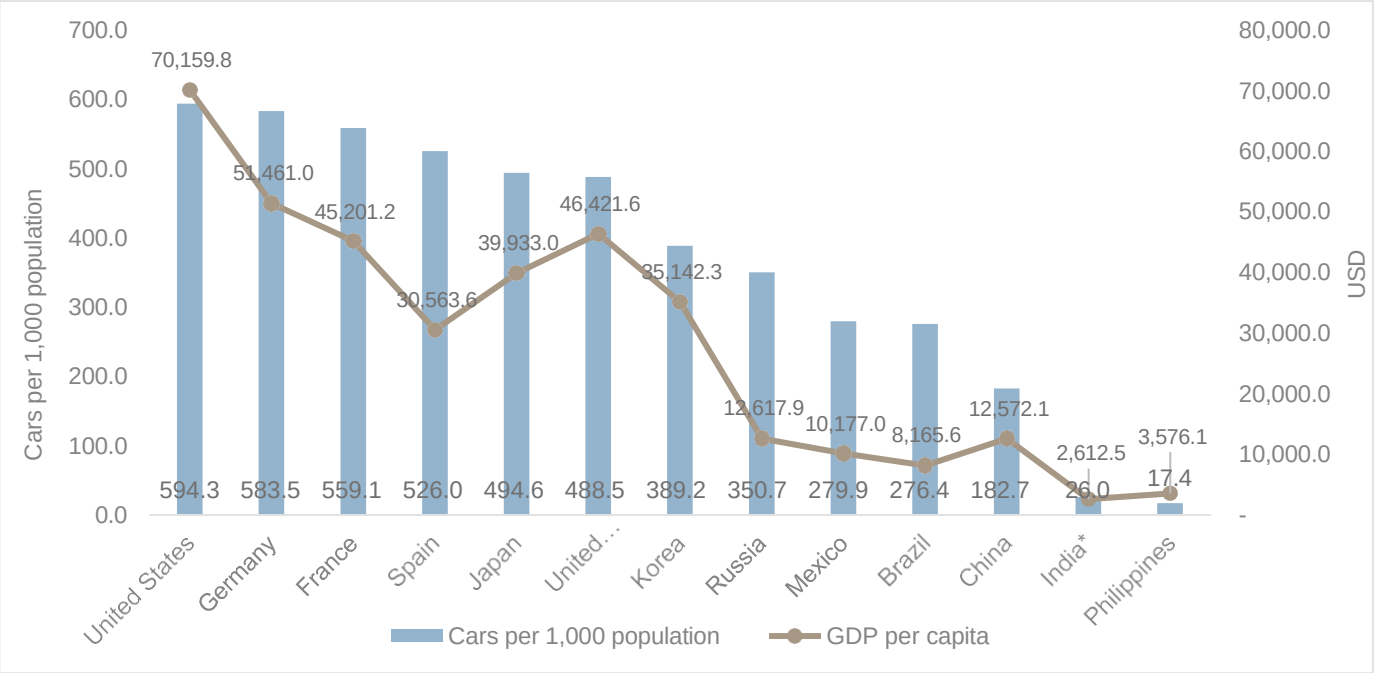
Source: IMF, CRISIL MI&A

Vehicle Penetration in India

India's car market is extremely underpenetrated compared with most developed economies and some developing nations. The Indian PV market is one of the fastest growing in the world and was ranked second in terms of annual sales (after China) in 2023. However, the market is still highly underpenetrated compared with most developed economies, or even developing countries such as China, Brazil and Mexico. According to CRISIL MI&A, India had 26 cars per 1,000 people as of fiscal 2024. This is significantly lower than the developed nations and even emerging nations like Brazil, Russia, and Mexico. This provides significant headroom for growth, especially given the expected increase in disposable incomes, faster economic growth, younger population, and increased focus

from international OEMs. With penetration below the global average, India offers tremendous growth potential for automobile manufacturers.

Country-wise car penetration, CY 2021



Note: Data for CY 2021, India Data for FY24;
Source: International Road Federation- World Road Statistics 2023, CRISIL MI&A

Safety norms

Bharat New Car Assessment Program (BNCAP) was launched by Ministry of Road Transport and Highways (MoRTH) on August 22th, 2023 with an aim to enhance the road safety of passenger cars by increasing the vehicle safety standards of these vehicles. BNCAP would promote a healthy competition between home grown OEMs and international OEMs to manufacture safer cars along with pushing the safety and quality of the vehicles in India. BNCAP rating system is a voluntary assessment program and came into effect on October 1, 2023.

GST tax structure

The government can change the course of the PV industry by changing the tax structure. Through GST, the government reduced tax rates slightly and increased the cess in order to reduce the price parity with pre-GST regime. The government has been levying high tax on diesel vehicles in order to discourage use. Consumers have a preference for diesel vehicles due to the better mileage as against petrol variants. In order to encourage electric vehicles (EVs), the government has reduced taxes on EVs from 12% tax to 5%, much lesser than internal combustion engine vehicles (28%). Also, the excise duty on petrol is a variable which the government adjusts to control fuel prices, which again has a high correlation with the PV industry sales. Further, the government may aim to lower the GST for hybrids to further minimize the usage of traditional ICE vehicles.

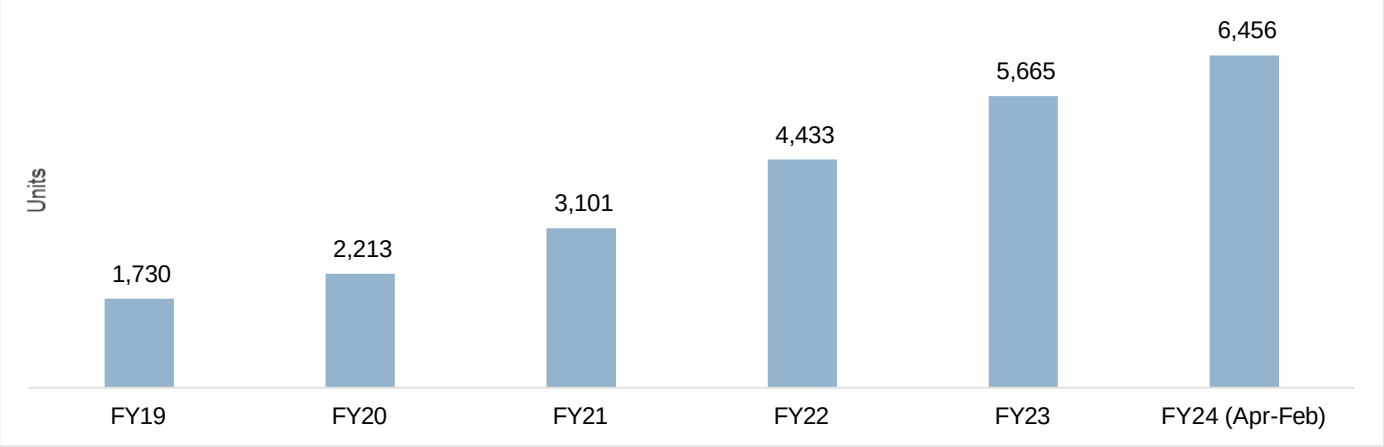
Government boost for Compressed natural gas (CNG)

In fiscal 2023, the government had increased the price of domestic natural gas to $6.1 per metric million British thermal unit (mmBtu) in first half of fiscal 2023 and increased further 40% to $8.57 per mmBtu in second half of fiscal 2023 following elevated gas prices at international level on account of the Russia-Ukraine war. On April 6, 2023, the Cabinet Committee on Economic Affairs chaired by Prime Minister Narendra Modi approved a revised pricing mechanism for natural gas produced in India, based on the recommendations made by the Kirit Parikh Committee in December 2022. The committee evaluated ways to boost natural gas production and ensure availability and affordability for end-users. The recommendations by the committee focused on price capping, deregulating the gas market, and bringing natural gas under the goods and services tax (GST) umbrella.

With the new pricing mechanism, the domestic gas price was capped at $6.5 per mmBtu for the fiscal 2024. Thus, CNG prices declined by 4% to Rs 74/kg fiscal 2024. This decline in prices resulted the difference in total cost of ownership between diesel and CNG, favouring CNG transition and hence the long-term prospects for CNG adoption remain promising.

Fluctuating fuel prices and potential government incentives for eco-friendly alternatives could potentially ignite demand for CNG-powered vehicles. Moreover, advancements in CNG technology and the expansion of refuelling infrastructure may enhance the appeal of CNG models, offering a greener and more sustainable solution for the transportation sector.

Number of CNG Stations, FY19-FY24 (Apr-Feb)



Note: For FY24 - April 2023 to February 2024 period as updated on PPAC
Source: Petroleum Planning & Analysis Cell (PPAC), CRISIL MI&A

According to PPAC, as of fiscal 2023 there were around 86,855 retail fuel outlets in India. As of 1st June 2024 this number increased to 90,334. The availability of refuelling infrastructure for traditional fuels are also on the rise, however, on a lower rate compared to CNG and EVs.

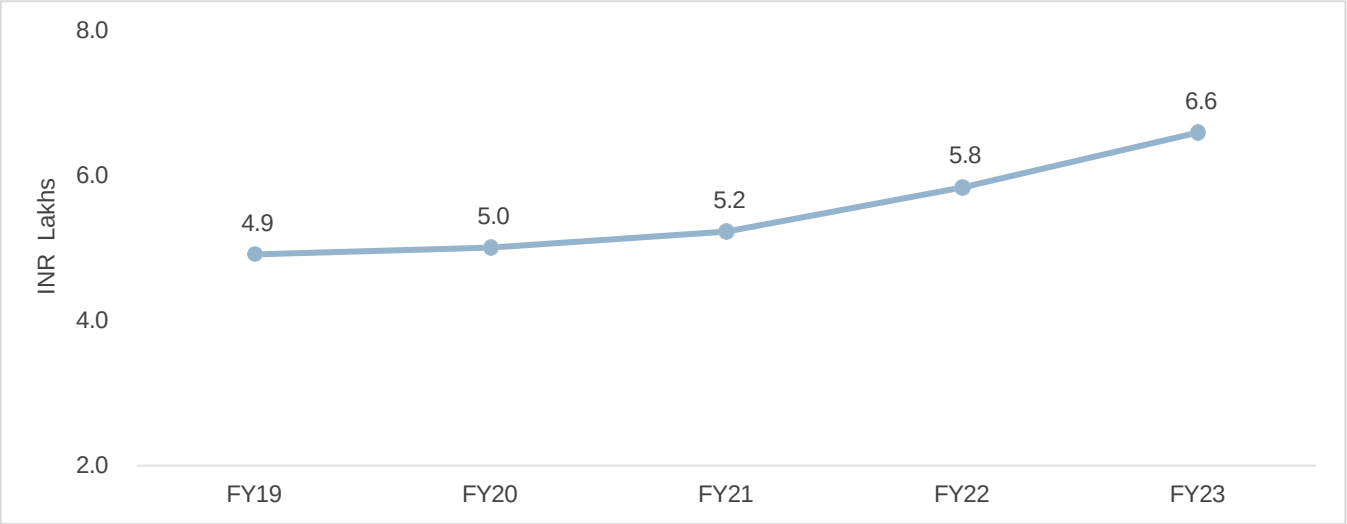
Premiumization trend

The average selling price (ASP) between fiscal 2019 and 2023 increased at a CAGR of 7-8% because of premiumization trend as well as sharp rise in vehicle prices. Modern consumers in India are preferring mid-end or top end version of the vehicles moving away from the traditional fuel-efficient budget friendly small cars towards higher priced feature loaded larger cars which offer much more space, taller ride height, seamless connectivity, and improved performance. Further, there has been a major shift in customer preference with the launch of compact and mid-size SUVs. The share of small cars (hatchbacks) reduced from 46.9% in fiscal 2019 to 34.4% in fiscal 2023. This was majorly driven by shift in consumer sentiments towards newly launched feature rich vehicles in the

SUV segment. During the same period, share of SUVs increased from 23.1% in fiscal 2019 to over 50% in fiscal 2023. Increase in spending from the upper middle class after pandemic led to more purchases of SUVs supported by higher number of model launches in the SUV category (which have higher profit margins) and increase in affordability with launch of compact SUVs led to cannibalization of hatchbacks and compact sedans.

The rise in penetration of digital technologies and safety features in the vehicles also aid this ASP growth. There is a growing adoption of cars equipped with sunroof, digital infotainment systems and smart phone connectivity solutions. Modern car buyers who are aware of the safety standards are preferring cars equipped with necessary features like airbags, disc brakes and so on. These systems coupled with inclusion of modern LED lights, camera and radar systems are increasing the overall cost of a vehicle. For example, Hyundai introduced sunroof in their i10 and i20 hatchback back in 2008-09. From then till now, most of the models offered from the company provides sunroof as an option and the company has played a crucial role in popularising modern features in India.

Trend in average vehicle price (ASP)



Note: Based on OEM factory cost;
Source: CRISIL MI&A

New model launches

Apart from increasing sales of existing models, sales of new models have supported the overall industry's growth in the past decade, thereby driving demand. Most recent launches were mostly SUVs, which accelerated growth of the industry. As of fiscal 2023, a total of 10 new models were launched in various segments. These new models contributed to 3.1% of overall PV sales in that fiscal. Few of the notable model launches includes Maruti Suzuki Grand Vitara, Toyota Urban Cruiser Hyryder, Volkswagen Virtus, Innova Hycross and Hyundai Ioniq 5. In fiscal 2024, a total of 9 models were launched that contributed to over 6.6% of PV sales. Key model launches include Maruti Suzuki Fronx, Hyundai Exter, Honda Elevate and MG Comet EV. Going forward, the new vehicle pipeline is expected to provide additional thrust to domestic sales.

EV penetration in Passenger Vehicles

Amid rising environmental concerns, electric vehicles (EVs) are gaining traction globally, including in India. The country is one of the signatories to the Paris Agreement under the United Nations Framework Convention on Climate Change. It is also part of the EV30@30 campaign, targeting a 30% sales share for EVs by 2030.

To accelerate EV adoption, the government has been incentivising consumers by extending support via FAME (Faster Adoption and Manufacturing of (Hybrid &) Electric Vehicles in India) subsidy as well as tax cuts. The government announced INR 100 billion for Phase II of FAME, which commenced on April 1, 2019. The policy aims to provide a subsidy of INR 10,000 per kWh to four-wheelers (battery EVs, plug-in hybrid EVs, strong hybrids) for commercial purposes and public transport. It also envisions creation of infrastructure for charging of EVs.

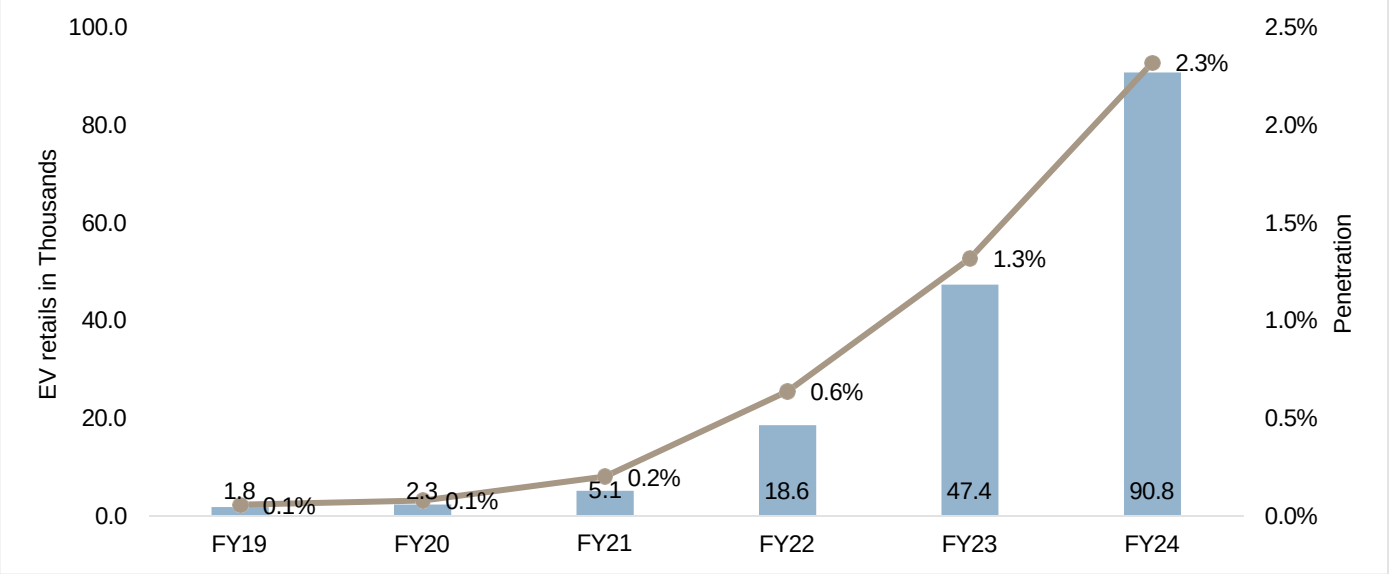
These schemes alongside the Production Linked Incentive (PLI) schemes, scrappage policy as well as the Make in India initiative is setting up the roadmap for widespread EV manufacturing and adoption. (Policies have been covered in detail in earlier sections)

Furthermore, the government is taking measures to address one of the major concerns regarding EVs: range anxiety (fear of running out of charge in the middle of the journey) due to low availability of public charging infrastructure. To address this concern, and support an ecosystem to accelerate EV sales, the Ministry of Road Transport and Highways is setting up new EV charging stations as well as supporting the expansion of charging stations in homes and commercial centers.

Government support, coupled with rising awareness about EVs, environmental concerns, expansion in EV infrastructure as well as increasing EV model portfolio is driving electrification in India. The EV segment received a real thrust in the last two years backed by model launches at competitive rates, price hikes in ICE vehicles and elevated & petrol diesel costs. While EVs bring several cost benefits and have evolved into a desirable powertrain choice today, the public perception towards electric vehicles and awareness against pollution from ICE vehicles also played a major role behind the rise in EV adoption across the country.

EV adoption in India is led by two wheelers and three wheelers, however, passenger vehicles are fast catching up. EV penetration in the passenger vehicle (PV) segment was insignificant till fiscal 2021 amidst limited vehicle portfolio coupled with lower customer awareness. Fast expansion in portfolio (3 models in fiscal 2019 to about 14 models in fiscal 2024), rising awareness, government push and expanding supporting infrastructure caused a sharp rise in EV adoption. EV retails increased from about 2 thousand vehicles in fiscal 2019 to 89 thousand vehicles in fiscal 2024: a 45x increase in 5 years. In turn, the penetration of EVs within the industry retails rose from 0.1% in fiscal 2019 to 2.3% by fiscal 2024.

Domestic passenger vehicles EV retails and penetration trend



Note: VAHAN figures exclude Telangana, Lakshadweep retails

Source: VAHAN, CRISIL MI&A

With only a handful of vehicle options like Reva, E Verito, and Bolt, EV adoption in passenger vehicles was inconsequential in fiscal 2019. One of the most popular EVs in India, Nexon EV was launched in the second half of fiscal 2020 providing the thrust to the passenger vehicle EV adoption. The launch of Kona electric (H1 fiscal 2020) as well as ZS EV (H2 fiscal 2020) provided further boost to the vehicle adoption during fiscal 2020. Continued traction for these models helped EV retails clock a sizeable growth during fiscal 2021. However, pandemic decelerated the growth pace of EVs, given the higher acquisition costs, strained production levels as well as financial pressure on the consumers.

Real impetus to the EV adoption started from fiscal 2022. Gradual normalization of economy, improvement in macro-economic scenario, increase in mobility, expansion in EV portfolio and continued government support aided the EV adoption growth. Moreover, further rise in ICE vehicle prices, sharp hike in petrol diesel prices, increasing in customer awareness and younger buyers provided an added impetus to EV adoption.

Entry of new players like BYD as well as introduction of models like Tiago EV, Tigor EV, Punch EV, XUV4OO, Comet EV, eC3, Ioniq, Atto 3 in a short span provided the thrust to the EV adoption. In fact, with the introduction of Tiago, Comet in the hatchbacks segment and Tigor in the sub 4-meter sedan segment, expanded the customer reach for EVs. Traction for Tigor for commercial fleet usage further aided the EV growth.

During fiscal 2021 to fiscal 2024 period, EV retails increased at ~160% CAGR (17x). This sharp rise in EV retails translated into 2.3% EV penetration in fiscal 2024.

However, electrification in the passenger vehicle segment is still at a quite nascent stage and there is a sizeable scope of expansion going ahead.

Outlook of Indian PV Industry (FY24-FY29)

The domestic passenger vehicle industry grew at a 5% CAGR during fiscal 2019-24 period. Despite the pandemic hiatus, the industry achieved this growth from a record high base of fiscal 2019; led by the sharp rise in traction for the SUV segment, increased vehicle launches coupled with the entry of newer players. Relatively lower impact on disposable income of the upper middle class led to a significant growth in the SUV segment driving overall PV sales. In turn, the industry reached a historic high of about 4.2 million vehicle sales in fiscal 2024.

Despite this healthy growth, India's car penetration (26 cars per 1000 people- fiscal 2024) is still much lower than the car penetration of global peers like China (183), Mexico (280), Brazil (276) as well as of developed countries like United States (594), UK (489), Japan (495) and Korea (389). Thus, there is a lot of headroom for growth for the Indian domestic market.

Going ahead, CRISIL expects the macroeconomic scenario to lend support to the industry growth with GDP projected to grow at a healthy pace between fiscal 2024 to fiscal 2029. India's GDP growth is expected to outperform other major geographies in the next 5 years with an expected growth rate of 6-8%. India's inflation levels are also expected to remain subdued in the 3-5% range, which is within the RBI's target band. CRISIL has assumed 3 years of normal monsoons within the 5-year outlook period and has considered positive momentum in rural demand. Fuel prices are also expected to remain near steady in the next 5 years. These favourable macro-economic factors are expected to aid the consumer disposable income levels.

Besides the macro-economic factors, continued support from government in terms of policies as well as continued expenditure & investments are expected to provide an added support. The favourable demographics is an added advantage for India which is also expected to help propel the passenger vehicle industry forward.

Additionally, OEMs are expected to continue with launches of feature rich competitively priced vehicles aiding the overall demand growth.

The financing scenario is projected to remain favourable for the industry and will lend further support amidst expanding financing reach and high Loan to Value (LTV) levels. Moreover, after multiple rate hikes in the last 2 years, a rate cut of 25-50 bps is expected in the near term keeping the interest rates competitive in the short-term horizon. Given the subdued inflation levels projected for the long term horizon, a further rate hike seems unlikely.

The changing consumer dynamics including younger consumer base, premiumization, electrification, shorter replacement cycles (4-5 years currently vis a vis 7-8 years a decade ago) will provide further impetus to the demand. Additionally, the government's push for scrapping of old vehicles is expected to help in shortening replacement cycles and hence aid demand.

Over and above these demand drivers, the capacity expansion by players like Maruti Suzuki, Hyundai, Tata Motors is expected to support the growing vehicle demand. Moreover, the expansion in the supporting infrastructure like EV charging stations and CNG pumps will also aid choices for customers across powertrains.

CRISIL MI&A expects the industry to clock 4.5-6.5% CAGR between FY24 to FY29 period to reach 5.2-5.7 million domestic vehicle sales.

Domestic PV Industry outlook (volumes)

Source: SIAM, CRISIL MI&A

Segmental Outlook

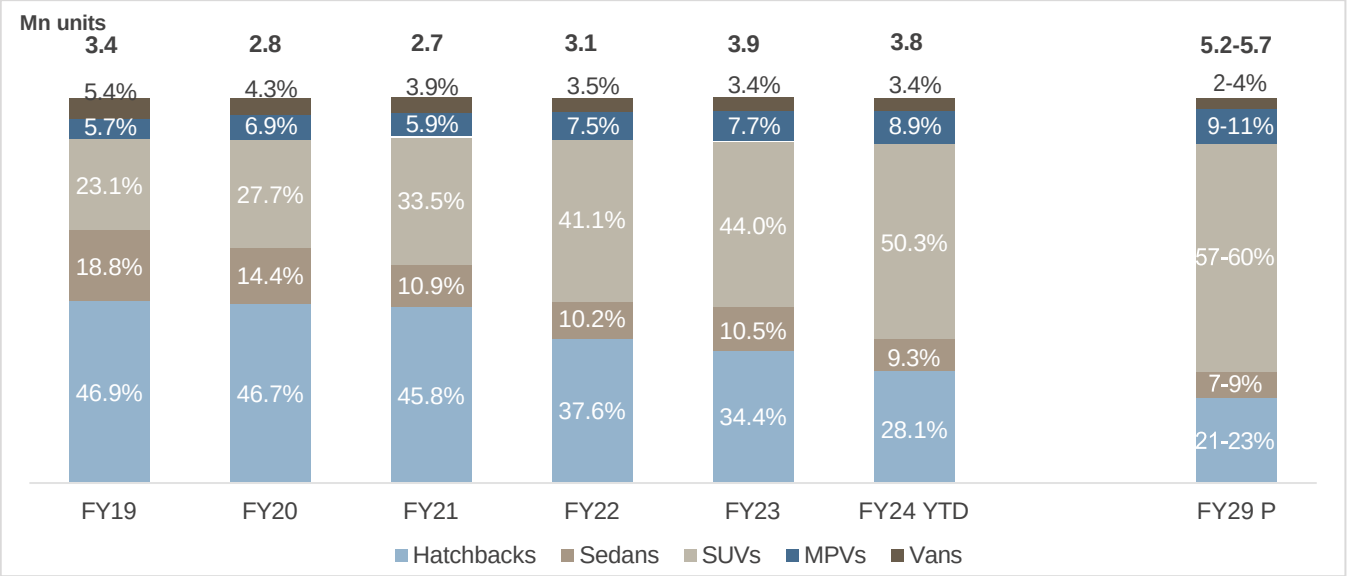
Growth in the domestic industry is expected to be led by the SUV and MPV segments while the hatchback, sedan and vans segments are expected to clock muted growth going ahead.

Segmental growth outlook

Segment	FY19-FY24 CAGR	FY24-FY29P CAGR
Hatchbacks	**(6) %**	**0 - 2.0%**
Compact Hatchbacks	(8) %	(1) -0.5%
Premium Hatchbacks	0%	1.5 - 4.0%
Sedans	**(9) %**	**0.5 - 2.0%**
SUVs	**23%**	**7.0 – 9.0%**
Compact SUVs	23%	6.8 - 8.8%
Mid-Size SUVs	24%	7.8 – 10.0%
Large SUVs	21%	7.2 – 9.2%
MPVs	**14%**	**6.4 - 9.4%**
Vans	**(5) %**	**1.1- 2.0%**
Total	**5%**	**4.5 – 6.5%**

Source: SIAM, CRISIL MI&A

Industry segmental split outlook



Source: SIAM, CRISIL MI&A

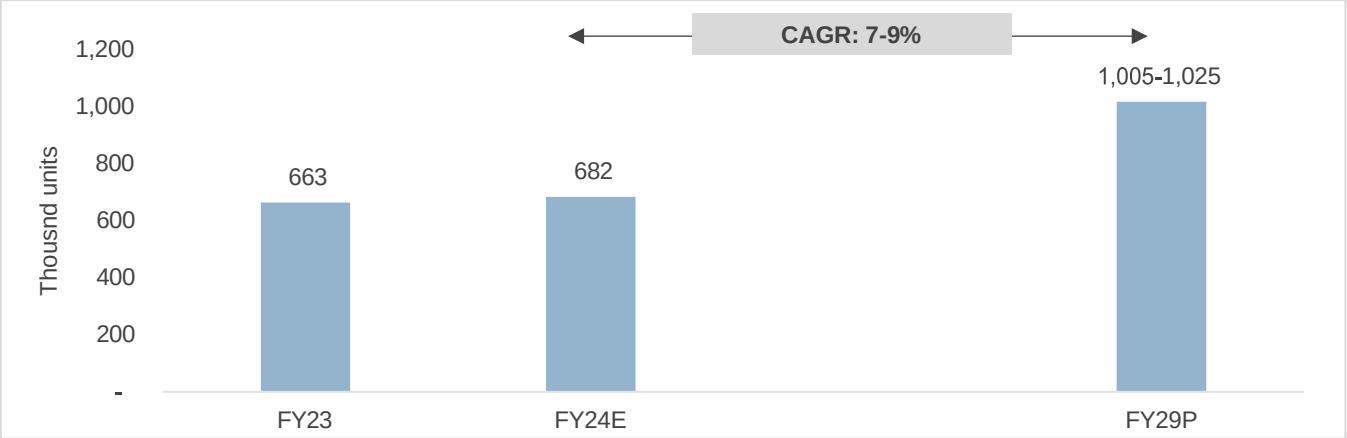
PV Exports Outlook for India

Passenger vehicle exports from India is expected grow at 3.1% in fiscal 2024 and at a CAGR of 7-9% between fiscals 2024 and 2029. Anticipated economic growth in key export regions along with push from OEMs will make India the base of exports for certain models, which in turn will boost exports. While the outlook for Middle East and Asia remains positive, the ongoing Iran-Israel conflict would remain a key monitorable. Any escalation of the conflict could push the oil and gas price alongside impacting the shipping through the Strait of Hormuz. Rise in crude oil prices could impact the fuel prices in export destinations thereby increasing the inflation pressure and impacting exports demand from India.

Few years back, India was major export hub for cars like hatchbacks and compact sedans. However, India has successfully transitioned to be a large car (Premium sedans and SUVs) exporter over the last 5-6 years. OEMs are actively broadening their portfolios to cater the changing consumer preferences in both domestic as well as global markets. SUV sales are accelerating exports and models like the Hyundai Creta, Maruti Suzuki Grand Vitara, Hyundai Venue, Toyota Urban Cruiser HyRyder, Maruti Suzuki Jimny, Maruti Suzuki Fronx, and Volkswagen Taigun have gained strong traction in the export markets. Further premium sedans like the Hyundai Verna and Volkswagen Virtus are key models driving the market for large cars.

Major OEMs in India are expanding their production capacities with an aim to make India as an export hub for Africa, Middle East, and Asia. Further, policies including PLI are offering a momentum to domestic OEMs for manufacturing and exporting EVs from India. Government offers incentives through PLI for entire EV ecosystem including automobiles, auto components and ACC batteries. Major OEMs in India have already announced plans to export EVs from India starting 2025-2026.

Outlook for exports (FY23-FY28P)



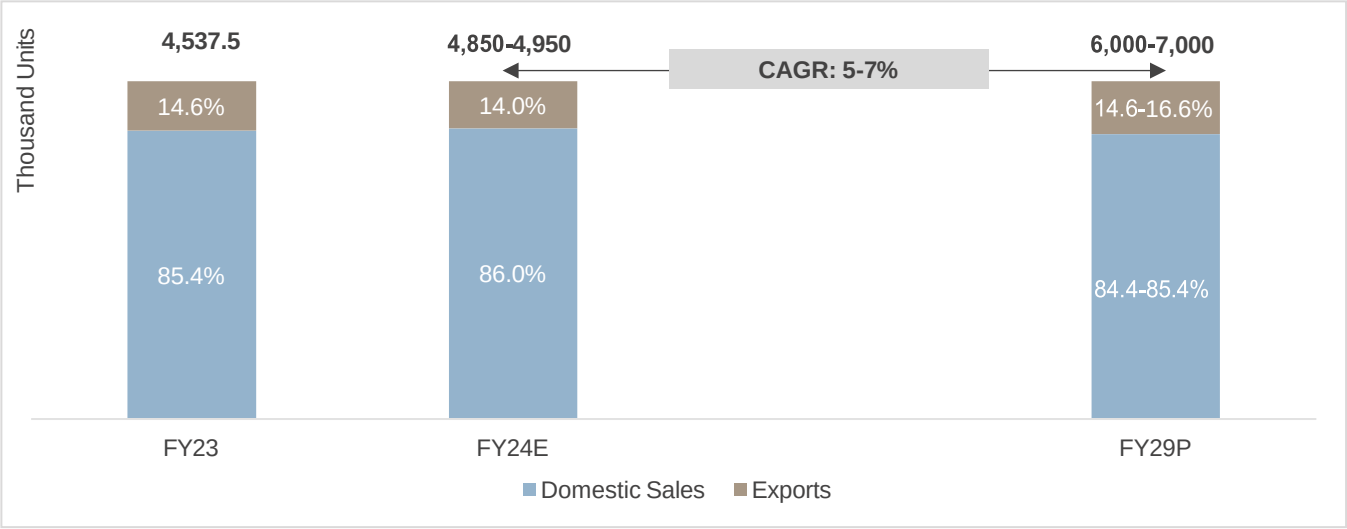
Source: CRISIL MI&A

India's economic relations with global economies through different trade agreements would enable Indian automotive companies to enhance the exports of automobiles and related components from the country. Recently India has established FTA with several nations including the UAE and Australia. India is also negotiating with the UK and the EU on establishing FTA. FTA agreements will offer immense potential to Indian OEMs, enabling them to tap into a broader customer base and establish as a key player in the global automotive industry. SUVs are gaining strong traction in the global markets and their exports are on the rise. This momentum is expected to continue this decade with SUVs crossing 40% share in exports and remain the fastest growing segment. Rising disposable income supported by lowering inflation growth rate in key export destinations like South Africa, Mexio and few others are expected to further aid the growth of SUVs, and overall exports.

Overall PV industry – Domestic Sales + Exports

Domestic sales, which formed 85.4% of overall industry in fiscal 2023, is expected to grow at 4.5-6.5% CAGR between fiscals 2024 and 2029P. Over the period, exports are forecast to grow at 7-9% CAGR reaching a share of 15.6% by fiscal 2029.

Overall PV industry by domestic sales and exports (FY23-FY29E)



Source: CRISIL MI&A

Key growth drivers and regulations/policies for domestic and export sales

Policies supporting EV adoption and EV supply chain

The Government of India has introduced a set of fiscal and non-fiscal incentives to support the adoption of electric mobility. In 2012, National Electric Mobility Mission 2020 (NEMMP 2020) was launched with a target of having 6-7 million electric vehicles on the road by 2020. This was further supported with the announcement of the Faster Adoption and Manufacturing of (Hybrid &) Electric Vehicles (FAME) scheme in 2015. The FAME scheme provides subsidies for the purchase of electric vehicles and for the installation of charging infrastructure. Further as a continuation policy, FAME II was introduced in 2019 to further support the EV ecosystem. Also, the government introduced Production Linked Incentive (PLI) and Phased Manufacturing Program (PMP) to support the EV supply ecosystem by supporting OEMs, battery manufacturers and tier suppliers. The PLI scheme for Advanced Chemistry Cell (ACC) (Rs 18,100 crore) along with the PLI Scheme for automotive sector (Rs 25,938 crore) and FAME II (Rs 10,000 crore) will enable India to adopt environmentally cleaner, and sustainable EV based system from the traditional fossil fuel-based automobile transportation system.

FAME policy (I & II)

As part of the National Electric Mobility Mission Plan (NEMMP) 2020, the Department of Heavy Industry (DHI) formulated the FAME I policy in 2015 with a budget outlay of INR 895 crore. The FAME I policy was aimed at promoting EV ecosystem through technology development, demand creation, pilot project, and charging infrastructure thereby ensuring its sustainable growth. In the FAME 1, about 2.78 lakh EVs were supported via demand incentives. In addition, 465 buses were sanctioned to various cities/states under this scheme. Phase-II of the FAME policy was implemented with an outlay of INR 10,000 Crore in 2019 for a period of 5 years, with the aim to support demand for EVs by supporting 7,000 e-Buses, 5 lakh e-3 Wheelers, 55,000 e-4 Wheeler (Commercial purposes) and 10 lakh e-2 Wheelers (including commercial & private). The Ministry of Heavy Industries (MHI) had sanctioned 520 Charging Stations/Infrastructure under the FAME I policy. Further, this Ministry has also sanctioned 2,877 Electric Vehicle Charging Stations in 68 cities across 25 States/UTs and 1576 charging stations across 9 Expressways and 16 Highways under FAME II.

Segment	Maximum vehicles supported	Approx size of battery (kWh)	Incentive offered (INR/kWh)	Maximum Ex-factory price to avail incentive (INR)
2W	1,000,000	2	10,000	1.5 lakhs
3W	500,000	5	10,000	5.0 lakhs
4W	35,000	15	10,000	15.0 lakhs
Bus	7,090	250	20,000	2.0 crores

In June 2021, demand incentive for 2Ws was increased to INR 15,000/ kWh capped at 40% of the vehicle cost. In June 2023, this was again revised and reduced to INR 10,000 per kWh of battery from INR15,000 per kWh earlier and the maximum subsidy cap from 40% to 15%.

PLI Policy

PLI for Automobile and Auto components

The government approved the PLI Auto policy in 2021 with a budget outlay of INR 25,938 crore for a period of 5 years from fiscal 2023 to fiscal 2027. Total Incentive per entire group company is capped at INR 6,485 crore. The policy offers incentives for manufacturing of Advanced Automotive Technology (AAT) Products. This policy would

further promote localization for AAT products and enable creation of Indigenous value chain. The policy consists of two components, incentivizing incremental sales of automobile and auto components named Champion OEM Incentive Scheme and Component Champion Incentive Scheme, respectively.

Champion OEM Incentive Scheme: The Champion OEM Incentive scheme is a sales value linked scheme, applicable to Battery Electric Vehicles (BEV) and Hydrogen Fuel Cell Vehicles (FCEV) of all segments – 2 wheelers, 3-wheelers, passenger vehicles, commercial vehicles, Tractors, Automobiles meant for Military use, and any other AAT vehicle as prescribed by MHI. The incentive scheme targeted to address the cost disabilities related to Advanced Automotive Technology vehicles faced by OEMs. depending upon technical developments

Component Champion Incentive Scheme: The Component Champion Incentive scheme is also a sales value linked scheme, applicable on pre-approved AAT components of all vehicles, CKD/SKD kits, Vehicle aggregates of 2-Wheelers, 3-Wheelers, passenger vehicles, commercial vehicles, tractors and any other AAT components prescribed by MHI.

A total of 115 companies had filed their application under the PLI scheme for Automobile and Auto Component Industry. As of September 2023, 18 applicants have been approved under this Champion OEM Incentive scheme. Approved list of applicants includes Tata Motors, Hyundai Motor India Limited, Asok Leyland, Eicher Motors Limited, Kia India Private Limited, Suzuki Motor Gujarat Private Limited and Mahindra & Mahindra Ltd. to name a few. Further, 67 companies have secured PLI approval under the Component Champion Incentive Scheme. Few of the beneficiaries include Sona BLW Precision Forgings Limited, Hero MotoCorp, Tata Autocomp, Toyota Kirloskar, Motherson Sumi, Lucas-TVS and Bosch.

The PLI Scheme for Automobile and Auto Component was able to attract proposed investment of INR 74,850 crores against the target estimate of investment INR 42,500 crores over a period of five years. In December 2023, the PLI scheme was revised and is now applicable for a continuous period of five financial years, commencing from the fiscal year 2023-24. The disbursement of the incentive is scheduled for the subsequent financial year, April 1, 2024, to March 31, 2025.

PLI for Automotive and Advanced Chemistry cells (ACC)

The Government of India on May 2021 approved the PLI policy on Advanced Chemistry Cell (ACC) Battery storage with a budget outlay of INR 18,100 crores for setting up battery manufacturing facilities with a total capacity of 50 Giga Watt Hour (GWh). This policy will strengthen the ecosystem for electric vehicles and battery storage in the country. The policy aims to enhance India's manufacturing capabilities of ACC by setting up of Giga scale ACC battery manufacturing facilities in India with emphasis on maximum domestic value addition. Under the scheme, the beneficiary OEM must achieve a domestic value addition of atleast 25% and raise it to 60% within 5 years while also making the mandatory investment of INR 225 crore /GWh for committed capacity within 2 years. The incentives under the PLI scheme will be disbursed over a fixed period of five years, from the time of commissioning of the manufacturing facility.

In the first round of PLI awards (March 2022), three companies secured incentives: Ola Electric for 20 GWh lithium-ion cell manufacturing, Reliance New Energy for 5 GWh sodium-ion cell manufacturing, and Rajesh Exports for 5 GWh lithium-ion cells. These companies committed a combined investment of INR 27,000 crore for the scheme. In the next round of bidding, the government is unlikely to relax the criteria for localisation of cell manufacturing and the minimum bidding capacity is expected to remain at 5 GWh.

Phased Manufacturing Program

Under FAME II policy, PMP has been introduced with the aim of boosting domestic manufacturing of EVs, its assemblies/ sub-assemblies and parts/sub-parts thereby increasing the domestic value addition. The PMP is a

government initiative to promote the local manufacturing of EVs in India. The PMP offers a scaled duty structure for imported EV parts. To provide further impetus to electric mobility and promote indigenous development of electric vehicles, the central government has reduced and rationalized basic custom duty on electric vehicles.

The following Phased Manufacturing Programme (PMP) is notified:

S No	Item		Current BCD	PMP	
				Proposed BCD	Proposed date
1	CBU	Bus (HS 8702) & Trucks (HS 8704)	25%	50%	April 2020 onwards
2	SKD	PV(HS 8703) & 3W (HS 8703/8704)	15%	30%	
		2W(HS 8711)		25%	
		Bus(HS 8702)		25%	
		Truck(HS 8702)		25%	
3	CKD	Bus(HS 8704)	10%	15%	
		PV (HS 8703) 2W (HS 8711) 3W(HS 8703/8704)& Truck (HS 8704)			
4	Lithium-ion cells (HS 85076000) for use in the manufacture of Lithium-ion accumulator for electric vehicles		5%	15%	April 2021 onwards
5	Battery packs (HS 8507) for use in the manufacture of electric vehicles		5%	15%	
6	Parts for use in the manufacture of electric vehicles like AC or DC Charger AC or DC Motor AC or DC Motor Controller Power Control Unit (Inverter, AC/DC Converter, Condenser) Energy Monitor Contactor Brake System for recovering Electric Compressor		0%	15%	

Note: BCD: Basic Customs Duty, CBU: Completely Built Up, SKD: Semi Knocked Down, CKD: Completely Knocked Down
Source: MHI, CRISIL MI&A

Charging and EV Infrastructure policy

The government is actively promoting charging infrastructure and battery swapping to support the EV ecosystem in India. The plan is to establish five lakh public charging stations (PCS) by 2025, by offering financial assistance to states and private companies. This initiative addresses the lack of charging infrastructure which is a key barrier to EV adoption. Further through the revised guidelines and standards for charging infrastructure issued by Ministry of Power, the government aims to augment the station density/distance between two charging stations as below:-

At least one charging station to be made available in a grid of three-by-three km. Further one charging station to be set up at every 25 km on both side of highway/roads.

For long range and heavy duty EVs, there should be one fast charging station at every 100 km, one on each side of the road/ highway

Further, the policy was amended to cap the maximum tariff applicable to EV public charging. In addition to Battery Charging Stations (BCS), the government is also promoting Battery Swapping and released its draft Battery Swapping Policy in 2022. The policy is aimed at standardizing battery specifications and creating a battery swapping network by rollout of BSS in phased manner. This policy is targeted at supporting the adoption of battery-swapping for light electric power train vehicles (LEV) of category L, and E-Rickshaw/E-Cart. Also, the policy highlights the importance of re-use of end-of-first-life swappable batteries and recycling of end-of-life batteries.

Scheme to promote manufacturing of electric passenger cars in India

In March 2024, MHI introduced scheme to promote India as a manufacturing hub for EVs and attract investments from global EV manufacturers. Through the scheme, automakers can import 8,000 EVs per year with a provision for maximum 40,000 for a period of five years provided that thecompany commits to invest in India for local manufacturing. The scheme would also enable automakers to carryover unused annual imports during the same five-year period. EVs of minimum CIF (Cost, Insurance & Freight) value of USD 35,000 or above are eligible for reduced custom duty of 15% for the same period. Also, the total number of EVs allowed for import would be determined by the total duty foregone or investment made, whichever is lower, subject to a maximum of INR 6,484 crores.

The scheme mandates a minimum investment of INR 4,150 crores (USD 500 million) in India with a timeline of 3 years for setting up EV manufacturing facilities and commence the production of EVs. Further, automakers are expected to achieve a certain level of domestic value addition (DVA) in the next 5 years. DVA should gradually increase reaching 25% by the third year and 50% by fifth year. For availing benefits under this scheme, certain eligibility conditions in terms of global turnover and global investment needs to be met. Global group revenue from automotive manufacturing should be minimum INR 10,000 crores based on the latest audited annual financial statements during the time of application. Also, global investment of company or the group companies in fixed assets (gross block) of INR 3,000 crore at the time of application. Thus, the scheme would further augment the development of domestic EV ecosystem thereby strengthening the EV manufacturing and domestic value chain along with attracting investments from leading EV players around the world.

Policies towards battery recycling

The Battery Waste Management Rules 2022 were implemented to promote the reuse and recycling of Advanced Chemistry Cell (ACC) batteries in India. This policy focuses on financial incentives, standards development, and raising awareness about battery recycling. The traditional EV battery lifecycle involves extraction, manufacturing, usage, and disposal, but this policy encourages reuse and recycling, including secondary applications and metal extraction. It introduces Extended Producer Responsibility (EPR), making producers responsible for end-of-life battery collection and recycling. Targets are set for recovering battery materials and incorporating recycled content into new cells, with specific goals outlined for 2025-2030. The policy also promotes the reuse of swappable batteries in energy storage applications, aiming to create a battery bank for EV charging and other use

Scrappage Policy

The scrappage policy envisages phasing out of old passenger and commercial vehicles. The policy aims to curb air pollution, improve road, passenger & vehicle safety, enhance fuel efficiency, improve auto sector sales and boost availability of low cost materials for automotive, steel and electronics industry.

The process kicked off in May 2016, with the Ministry of Road Transport and Highways (MoRTH) issuing a concept paper outlining the Voluntary Vehicle Fleet Modernisation Programme to encourage scrapping of vehicles manufactured before March 31, 2005. The policy was declared during the 2021-22 union budget.

The policy requires passenger vehicles older than 20 years and commercial vehicles older than 15 years to pass a fitness test to continue plying on the road. The end-of-life vehicles, which do not pass the fitness test will lose the vehicle registration and will be scrapped. As per the policy, automated testing stations ATS and vehicle scrappage centres will be established in order to support the initiative.

The policy further introduces incentives to scrap the vehicles and offers discounts against the scrappage certificate issued by the scrappage centres. The incentives proposed include a scrap value to be given by the scrappage centre (4-6% of ex showroom price of the new vehicle), road tax rebate by the state governments, rebate in registration fees and discounts from OEMs while purchasing the new vehicle against the scrappage certificate.

The policy also introduces few dis-incentives for using the old vehicles including increased fees for fitness test and issuance of fitness certificate for commercial vehicles as well as increased re registration fees for private vehicles above 15 years of age. After 20 years of age, private vehicles will be de registered.

As per the policy, mandatory fitness testing for private vehicles, is proposed to commence from June 2024 in a phased manner.

EV incentives offered at state level

Many state governments have come forward and are providing incentives on purchase of electric vehicles, wherein the benefit provided is in addition to FAME-2 policy benefits.

Maharashtra is providing an incentive of INR. 5,000/kWh, subject to a maximum of INR 1.5 lakh/vehicle for the first 10,000 electric cars. The policy also provides 100% exemption on road tax until 2025. To encourage the replacement of old, polluting vehicles, the policy offers a scrappage incentive Up to Rs. 25,000 for four-wheelers..

Gujarat has announced an EV policy that would provide purchase incentives of INR 10,000/kWh, with vehicles having minimum 15 kWh battery and maximum ex-factory cost of INR15 lakhs. The policy will remain valid until 2025.

Bihar is providing an incentive of INR. 10,000/kWh subject to a maximum of INR 1.5 lakh. The policy also provides 100% exemption on road tax until 2024.

Odisha has announced a subsidy of INR 10,000/- per kWh for four-wheelers with subsidy capped at INR 1.5 lakh/per vehicle. The policy which was initially launched in 2021 was revised in April 2023.

Meghalaya is providing an incentive of INR 4,000/kWh for the first 2,500 electric cars. The policy also provides 100% exemption on road tax until 2026.

The Telangana government is also providing a 100% exemption of road tax and registration fee on purchase of first 5,000 electric cars until 2025.

The Tamil Nadu government is providing incentive of INR 10,000 /kWh for commercial electric cars with incentives capped at INR 1.5 lakh per vehicle and maximum 3,000 of vehicles incentivised per year.

Haryana government is providing direct purchase incentive of 15% of the ex- showroom price of vehicle maximum up to INR 6.0 lakh on purchase of EV in state for the first 1,000 units. This is applicable for the vehicles with price ranging from INR 15.00 lakh to 40.00 lakh.

-

Estimated penetration of Electric PV segment wise by FY29

As of fiscal 2024, the total cost of ownership (TCO) of an EV for a personal vehicle was 11% higher than that of a petrol vehicle and 6% higher than that of a diesel vehicle for 10,000 km. This is expected to be 3% lower versus petrol and 8% lower versus diesel in fiscal 2029 for the same distance, highlighting the financial viability of electric PVs for personal use application. Additionally, the TCO per km of an e-PV become even more economical without the subsidies by fiscal 2029 owing the lowering battery cost and improving technology.

TCO for private vehicles in fiscal 2024 for four-year ownership and annual running of 12,000 km

Annual running	6,000 km	10,000 km	15,000 km	18,000 km	20,000 km
EV vs petrol	19% higher cost than petrol	11% higher cost than petrol	4% higher cost than petrol	0.3% higher cost than petrol	2% lower cost than petrol
EV vs diesel	10% higher cost than diesel	6% higher cost than diesel	2% higher cost than diesel	0.2% higher cost than diesel	1% lower cost than diesel

TCO for private vehicles in fiscal 2029 for four-year ownership and annual running of 12,000 km

Annual running	6,000 km	10,000 km	15,000 km	18,000 km	20,000 km
EV vs petrol	4% higher cost than petrol	3% lower cost than petrol	10% lower cost than petrol	13% lower cost than petrol	15% lower cost than petrol
EV vs diesel	4% lower cost than diesel	8% lower cost than diesel	12% lower cost than diesel	14% lower cost than diesel	15% lower cost than diesel

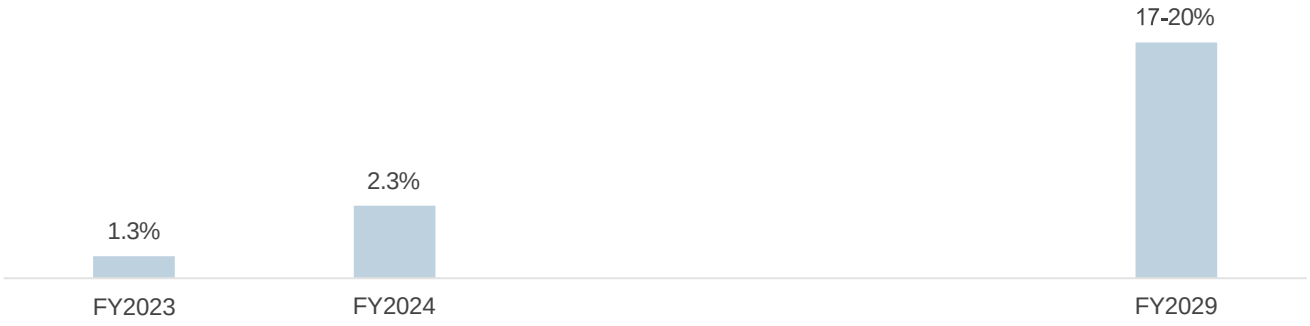
Note: Nexon EV and Nexon Petrol/Diesel variants have been considered for comparison

Source: CRISIL MI&A

The FAME-2 subsidy is only offered for commercial use and no benefits are provided for personal-car owners. The decreasing battery cost due to the localisation under PMP and PLI is expected to lower the cost of an EV and will help maintain the competitiveness of EVs against diesel and petrol variants in the long run.

EV penetration can be higher if the government adopts stricter policies on OEMs for not meeting CAFÉ norms. The exact quantum of EV penetration in an aggressive case depends on incentives given for adoption and setting up of charging infrastructure.

EV penetration outlook for passenger vehicles



Source: CRISIL MI&A Consulting

4. Review and outlook on the Global 2W Industry

Review of the global two-wheeler industry (CY 2019 to 2023)

The global two-wheeler industry underwent major transformation over 2019-2023. A confluence of factors fuelled tremendous growth, while unforeseen challenges reshaped the landscape. Urbanisation, particularly in developing economies, created a surge in demand for affordable and efficient transportation. According to the United Nations (UN) Department of Economics and Social Affairs, nearly 68% of the world's population will live in urban areas by 2050. Two-wheelers, with their manoeuvrability and fuel efficiency, have emerged as the perfect solution for navigating congested city streets. Furthermore, the rise of a strong middle class with increased disposable income fuelled the desire for personal mobility, propelling two-wheeler sales.

Rising fuel prices pushed consumers towards two-wheelers, known for their superior mileage compared with cars. Manufacturers responded by continuously refining engine technology to deliver even better fuel efficiency, attracting cost-conscious buyers. The explosion of e-commerce and last-mile delivery services created a massive demand for two-wheelers as the ideal solution for urban deliveries. This sector's reliance on two-wheeler mobility presented a lucrative opportunity for manufacturers, leading to the development of specialised delivery-oriented vehicles.

The emergence of electric two-wheelers, particularly in China and Europe, challenged the dominance of traditional ICE two-wheelers. Global crude oil prices and currency exchange rate affect gasoline prices worldwide as various economies import fuel from Gulf countries. Electric two-wheelers do not rely on fuel price fluctuations, making them an efficient alternative to gasoline-fuelled vehicles. Government subsidies for EVs, growing environmental awareness, and more financing options specifically tailored to these vehicles are emerging, with some lenders offering lower interest rates or extended repayment terms to incentivise adoption, all these factors have contributed to increased adoption of electric two-wheelers.

On the type front, motorcycles have been gaining increased preference in developed economies due to their expanding appeal of leisure riding and recreational activities, particularly among younger demographics seeking adventure and thrill. The versatility of motorcycles, suitable for both urban commuting and long-distance travel, further contributes to their popularity among riders looking for versatile transportation options.

Challenges such as inflation, interest rates fluctuations and regulatory changes will continue to influence the two-wheeler market to an extent but the interplay of established motorcycles/scooters, emerging electric alternatives, and evolving consumer preferences will shape the future of this dynamic market as far as global demand is concerned.

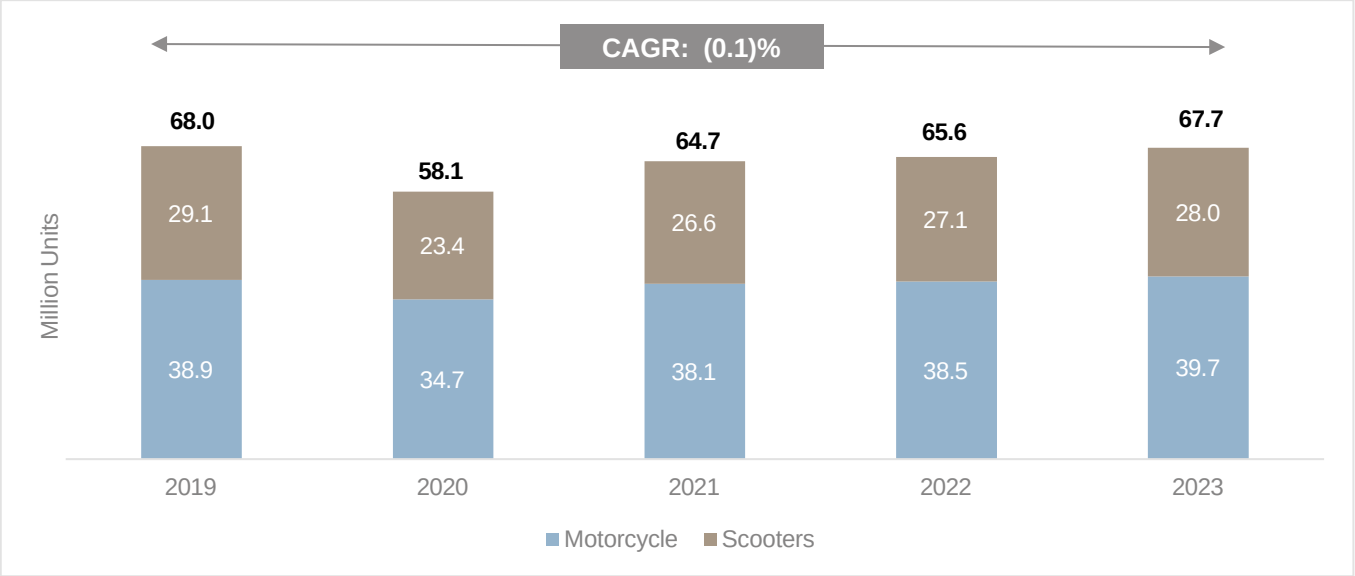
The global two-wheeler market contracted at 0.1% CAGR during CY2019 to CY2023 period. The industry witnessed a sharp contraction during the pandemic period and clocked a healthy 5.2% CAGR growth in the next 3 years to reach ~68 million levels in CY2023.

During CY2019-2023 period, motorcycles witnessed a 0.5% CAGR growth while scooters sales dropped at 0.9% CAGR. The drop in scooter growth was primarily due to the sharp 19.5% contraction witnessed during the pandemic.

In fact, scooters have grown at a faster pace of 6.2% CAGR between 2020-2023 albeit from a lowered pandemic base. On the other hand, motorcycles witnessed a slower growth at 4.6% CAGR during the post pandemic period.

Increased electrification especially within scooters helped industry clock a healthy growth especially post pandemic.

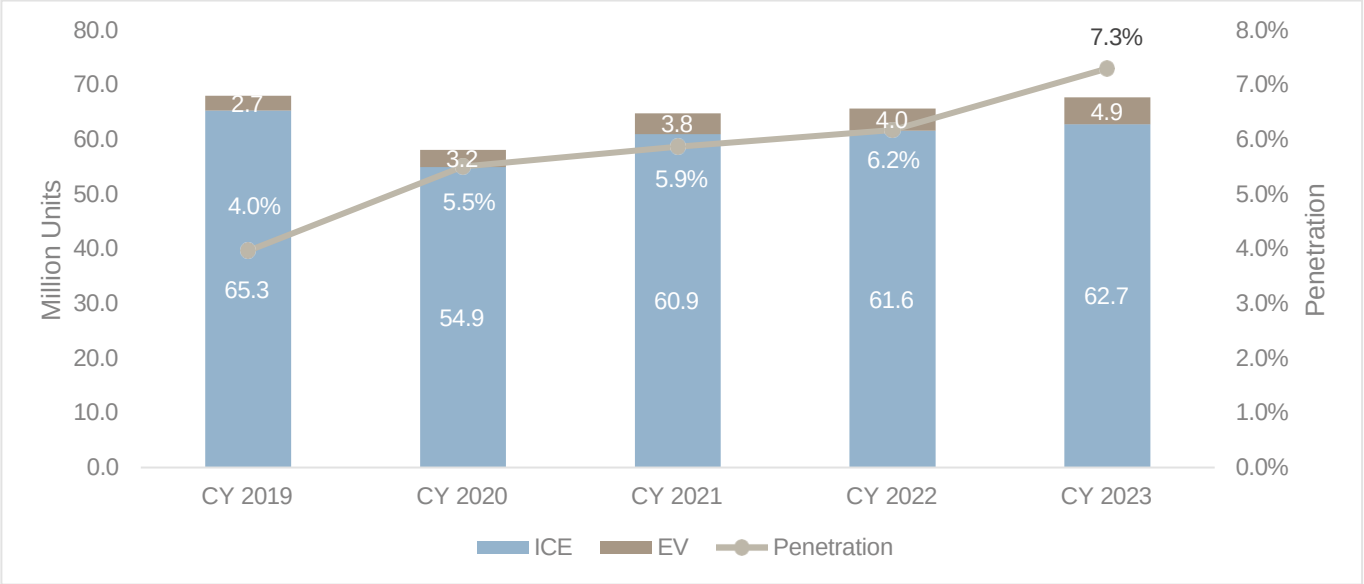
Global two-wheeler sales volumes trend



Source: MORDOR data

EV penetration within the overall two-wheeler industry has increased from 4.0% in 2019 to 7.3% by 2023. The penetration within scooters has increased from 8.2% in 2019 to 15.4% in 2023, while for motorcycles, EV penetration increased from 0.8% in 2019 to 1.6% by 2023.

Global two-wheeler sales powertrain split



Source: MORDOR data

Asia Pacific Region (APAC)

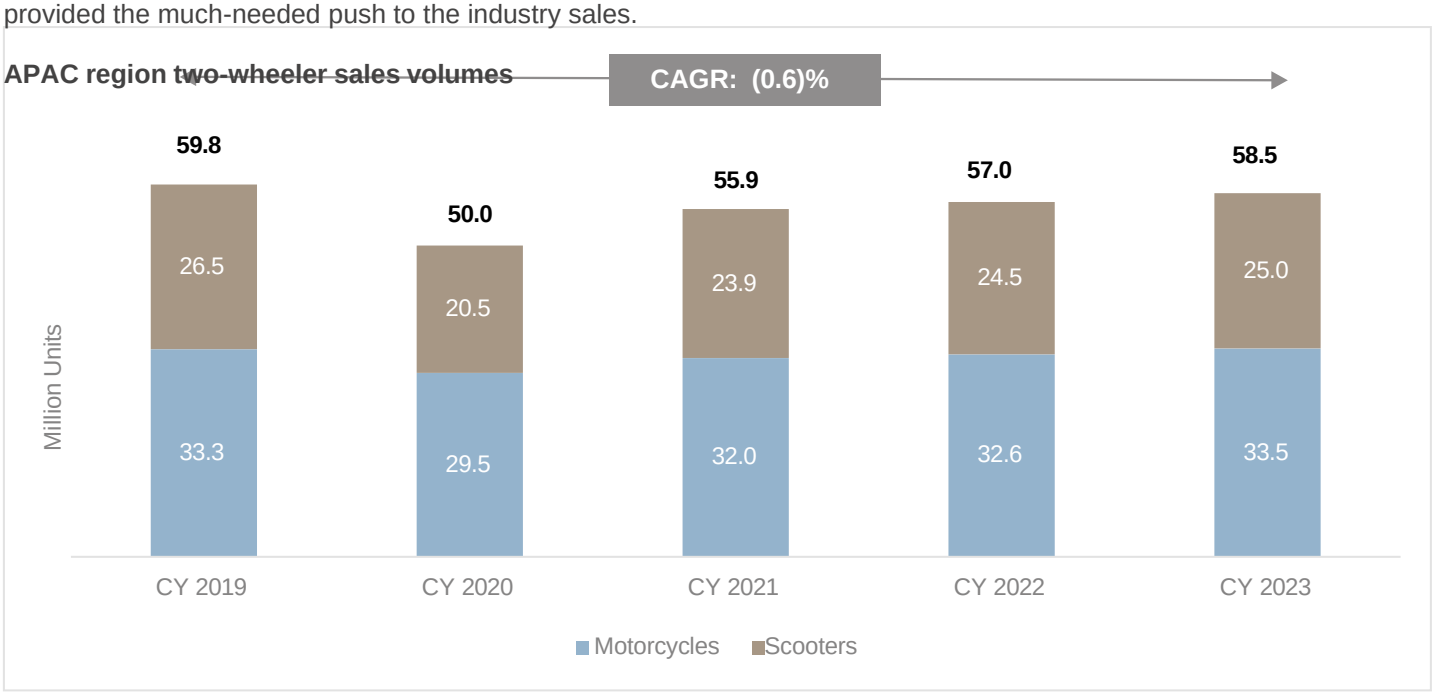
Asia Pacific Region dominates the world two-wheeler market with 85%+ share. The top two contributors to the global sales, India and China are part of the APAC region coupled with other large two-wheeler markets like ASEAN countries of Indonesia, Thailand, Vietnam, Philippines, Malaysia, Singapore, Myanmar, and Cambodia.

Within the APAC region, India is the largest contributor (30% share in 2023) followed by China (26% share) and ASEAN countries (22% share). Other APAC countries like Japan, Australia, New Zealand, South Korea have relatively limited share in regional sales.

During the CY2019-CY2023 period, two-wheeler sales in the APAC region remained near steady (0.6% CAGR drop) at volumes of ~59 million. During CY2019-2023 period, the major contributors, including India, China, Indonesia, Vietnam witnessed contraction in two-wheeler sales.

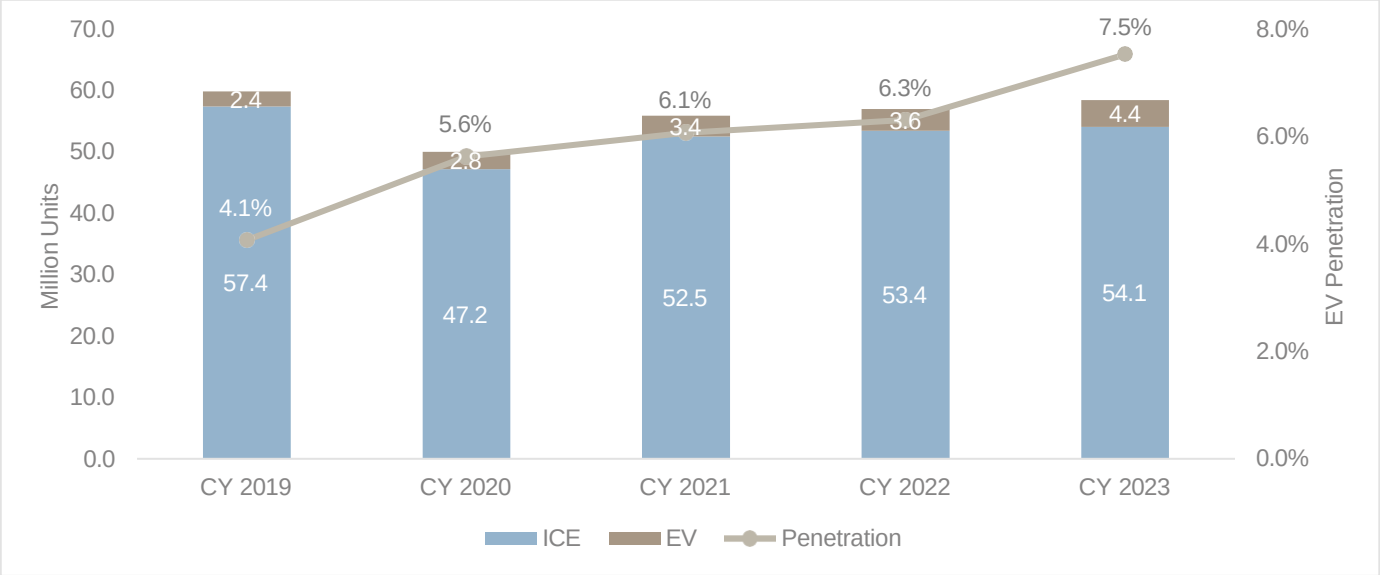
The pandemic (CY2020 and CY2021) impacted the macroeconomic environment globally. Additionally, there was reduced need of mobility amidst the lockdowns. Thus, two-wheeler sales witnessed contraction during that period. In the APAC region as well, sales contracted during the pandemic and increased at a gradual pace in the next 3 years led by improvement in economic landscape, higher need for mobility, pent-up demand coupled with increased traction for two-wheelers for ride hailing and food delivery applications. Moreover, the increased traction for e2W provided the much-needed push to the industry sales.

APAC region two-wheeler sales volumes



Source: MORDOR data

APAC region two-wheeler sales powertrain split



Source: MORDOR data

Within the two-wheeler sales, while the overall industry witnessed a minor drop during CY2019-2023, motorcycle sales were steady around 33.5 million. On the other hand, scooters witnessed a 1.5% CAGR drop.

This drop in scooter sales was despite the 4.3% CAGR growth witnessed in India, and a 7.1% CAGR growth in Malaysia, 0.5% for Vietnam and a steady sale for Thailand. The drop in scooter traction for China (1.4% CAGR), Indonesia (4.5% CAGR) and Philippines (0.9% CAGR) pulled the overall scooter sales down. After the pandemic hiatus, scooter sales have been improving gradually in Indonesia and Philippines, although the scooter sales have not reached the pre Covid levels by 2023. Growth in motorcycles sales in Indonesia and Thailand supported the APAC motorcycles sales during the period.

Although, the scooter sales for the APAC region have contracted, the e scooter sales for the region have clocked a healthy growth at 15.8% CAGR during CY2019-2023. Countries like India (97.0% CAGR growth), Malaysia (79.3% CAGR), Thailand (43.7%), Vietnam (27.3%), Indonesia (25%) led the growth in e scooter sales.

During CY2019-2023, EV sales grew at 16% CAGR while the ICE vehicle sales dropped at 1.5% CAGR. The higher traction for EVs, backed by government incentives, expanding vehicle portfolio, rising awareness, lower operating costs, helped the EV penetration to reach 7.5% during CY2023 from 4.1% in CY 2019.

EV sales within scooters increased at 15.8% CAGR and in turn the penetration within scooters increased from 8.2% in CY2019 to 15.6% by CY2023. Even, motorcycles witnessed increase in EV penetration during the same period- 0.8% in CY2019 to 1.5% in CY2023. EV penetration within motorcycles is relatively lower across countries and although it has grown at a slightly faster rate of 17.1% CAGR during CY2019-2023 period.

ASEAN – Part of APAC

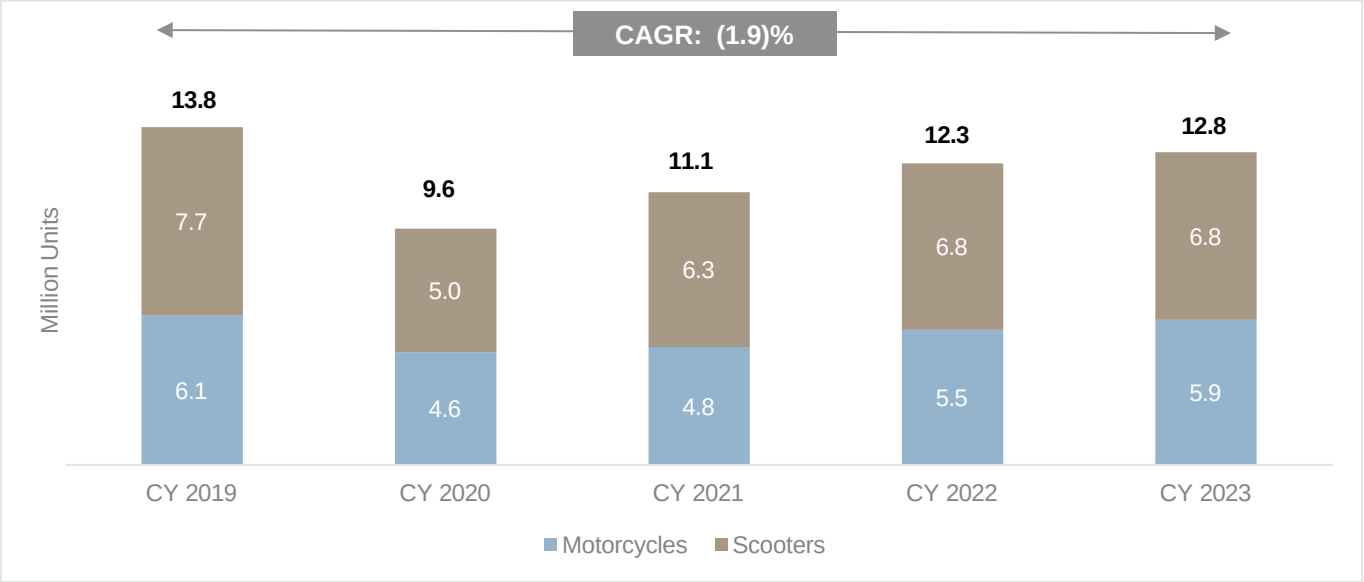
The ASEAN region is another sizeable contributor to overall global two-wheeler sales. It is part of the overall APAC region. ASEAN countries contribute about 20-22% to the APAC region two-wheeler sales and 17-19% to global two-wheeler sales. Two wheelers are the primary mode of transportation for a sizeable portion of customer base within the ASEAN region.

During CY2019-2023 period, two-wheeler sales in the ASEAN region contracted at 1.9% CAGR where major contributors within the ASEAN region, Indonesia (1% CAGR drop), Vietnam (6.2% CAGR drop), Philippines (2.3% CAGR drop) witnessing contraction during the period. Thailand, on the other hand, clocked 2% CAGR growth from CY2019 levels.

These ASEAN countries got significantly impacted during the pandemic. From the lowered base of CY2020 pandemic, a gradual growth in two-wheelers sales was witnessed supported by improvement in macroeconomic scenario, pent up demand, increased need of mobility and launch of feature rich vehicles. The increased need of two-wheelers for the flourishing ride hailing as well as food delivery applications amidst the rising congestion is another key factor which aided the growth of two-wheeler industry.

However, for most ASEAN countries, two-wheeler sales could not reach pre Covid levels.

ASEAN region two-wheeler sales volumes

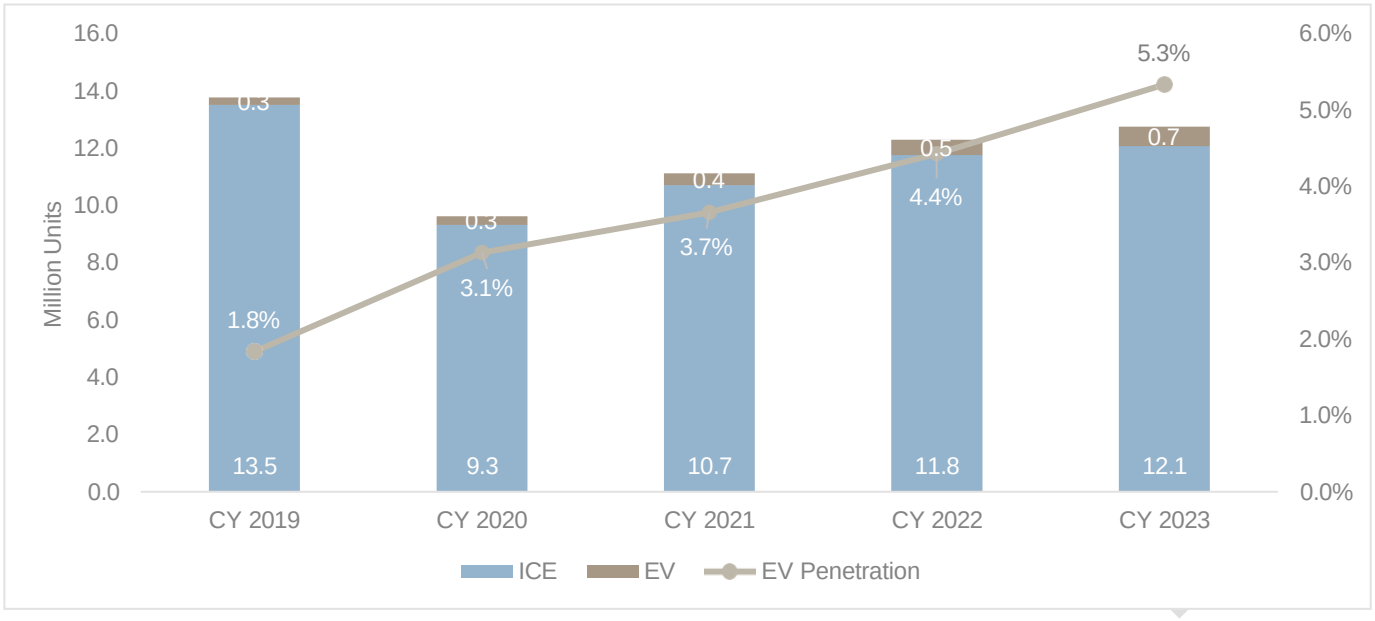


Source: MORDOR data

In ASEAN region, scooters are the leading contributors and enjoy high customer preference given its competitive pricing, ability to carry load, manoeuvrability and preference from women riders. However, during CY2019-2023, scooter sales contracted at a faster pace of 2.9% CAGR compared to a 0.7% CAGR drop witnessed by motorcycles. Motorcycles clocked faster pick up after the pandemic hiatus in few large contributing countries like Indonesia & Thailand restricting the drop in overall motorcycle sales.

While slower pick up in Indonesia and Philippines coupled with near steady sales in Vietnam and Thailand contracted scooters sales.

ASEAN region two-wheeler sales powertrain split



Source: MORDOR data

Although overall scooter sales dropped at 2.9% CAGR, e scooters clocked a healthy 26.9% CAGR growth led by lower operating costs, expanding portfolio and continued government support. The healthy growth in e scooter sales supported the EV penetration within scooters- from 3.2% in CY2019 to 9.4% in CY2023.

EV penetration is much lower in motorcycles, although it has grown from 0.1% in CY2019 to 0.6% in CY2023.

Africa

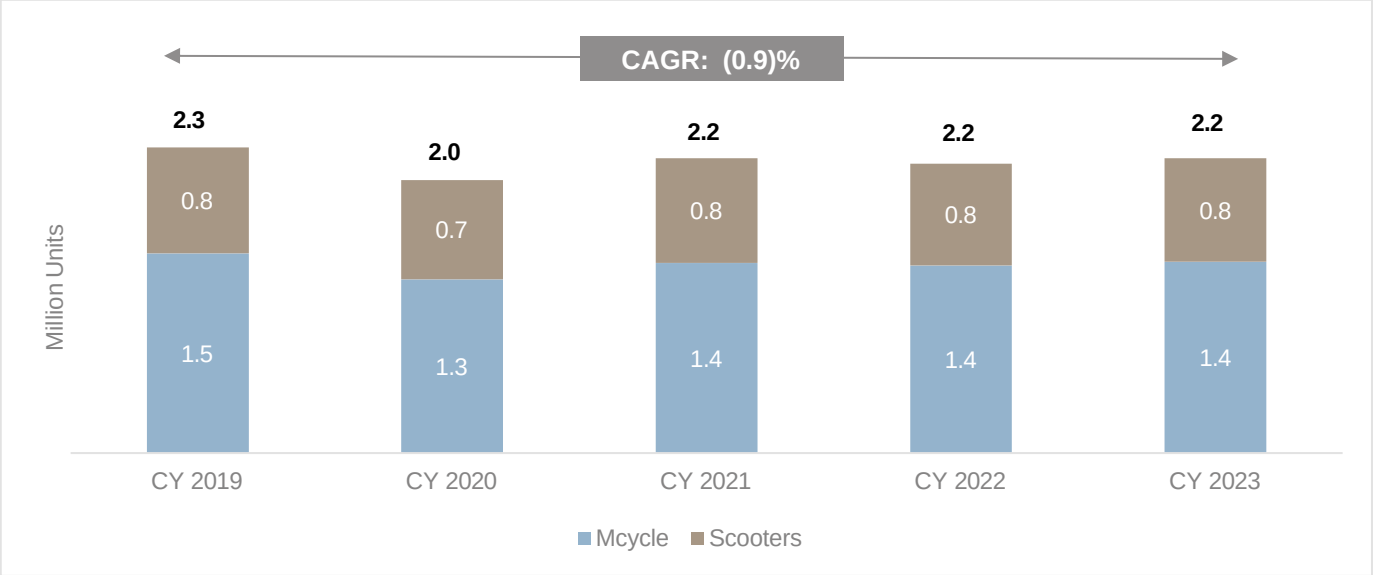
Africa is another large market for two-wheeler sales. In CY2023, Africa contributed 3.2% to global two-wheeler sales. Nigeria is the largest market for two-wheelers within Africa with 30% contribution in CY2023.

Two-wheeler sales in Africa witnessed the pandemic impact during CY2020. Gradual improvement was seen in the next three years with improvement in macroeconomic environment. The added requirement for last mile delivery services provided an added boost to the two-wheeler sales.

Despite the improvement, two-wheeler sales did not reach the pre pandemic levels of CY2019. During the CY2019-2023 period, overall, two-wheeler sales dropped at 0.9% CAGR.

Although relatively large contributors Nigeria, Kenya, Morocco witnessed some growth; contraction in Algeria, Zimbabwe and other smaller countries limited two-wheeler sales during CY2019-2023.

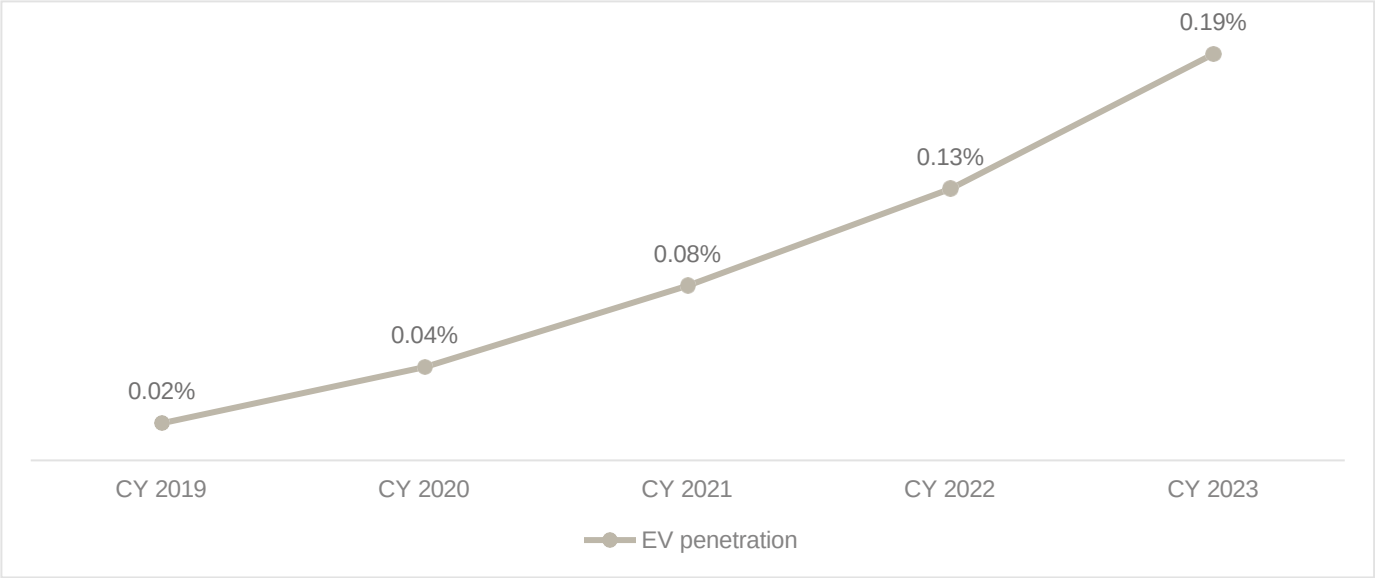
Africa two-wheeler sales volumes trend



Source: MORDOR data

Within the overall two-wheeler sales, motorcycles with ~65% share, contracted at a faster pace of 1.0% while scooters dropped at a slower pace of 0.6%. Nigeria, South Africa, Morocco, Ghana witnessed increased traction for motorcycles while Kenya, Algeria, Zimbabwe witnessed contraction in motorcycles sales. Increased scooter sales in Nigeria, Kenya, Ghana and Algeria restricted the fall in scooter sales.

Africa EV penetration trend



Source: MORDOR data

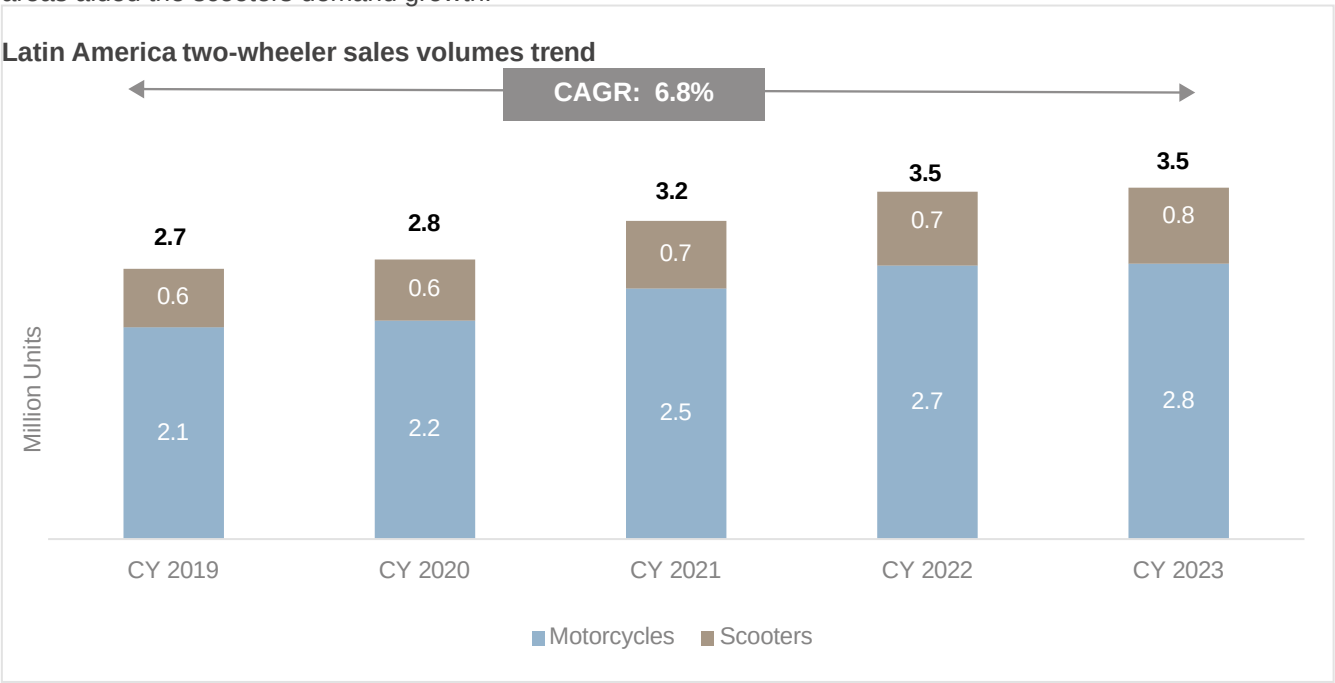
EV penetration within the Africa two-wheeler sales is currently insignificant amidst the low affordability, poor electricity access as well as low electricity reliability. However, EV sales have witnessed some improvement off the very low base in the last few years. In CY2023, EV penetration within two-wheeler sales reached 0.2%.

Latin America

Latin America witnessed a healthy growth at 6.8% CAGR in two-wheeler sales during CY2019-2023 period. The 7.2% & 10.0% CAGR growth clocked by the two major countries of Brazil (41% share in 2023) and Colombia (24% share in 2023) aided this healthy growth. Peru is another country which witnessed healthy growth, albeit from a low base. Restricted growth in Argentina and Mexico limited further growth in two-wheeler sales during the period.

The Latin American two-wheeler market is dominated by motorcycles contributing 78-80% to the annual two-wheeler sales. Motorcycles have clocked a 6.8% CAGR during CY2019-2023 period led by the rising demand from e commerce industry. On the other hand, scooters clocked a slightly slower growth at 6.6% during the same period. The rising preference for convenient cost effective scooters amidst the increasing congestion in urban areas aided the scooters demand growth.

Latin America two-wheeler sales volumes trend

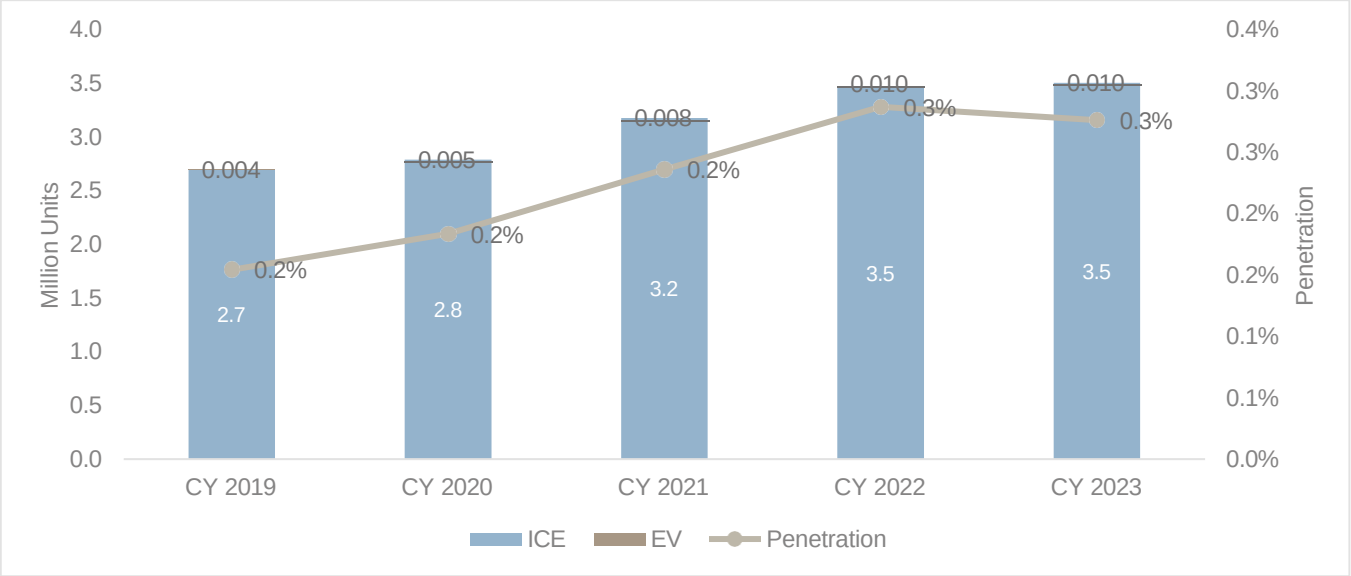


Source: MORDOR data

The EV penetration is very low in Latin American countries. It showed a marginal improvement from 0.2% of sales to 0.3% of sales. Although EVs have clocked a faster growth from a very low base, the penetration levels remained much lower than other regions like APAC, ASEAN and Europe.

Penetration within motorcycles in currently insignificant while in scooters it is relatively better and has increased from 0.7% in CY2019 to 1.2% in CY2023.

Latin America two-wheeler sales powertrain split



Source: MORDOR data

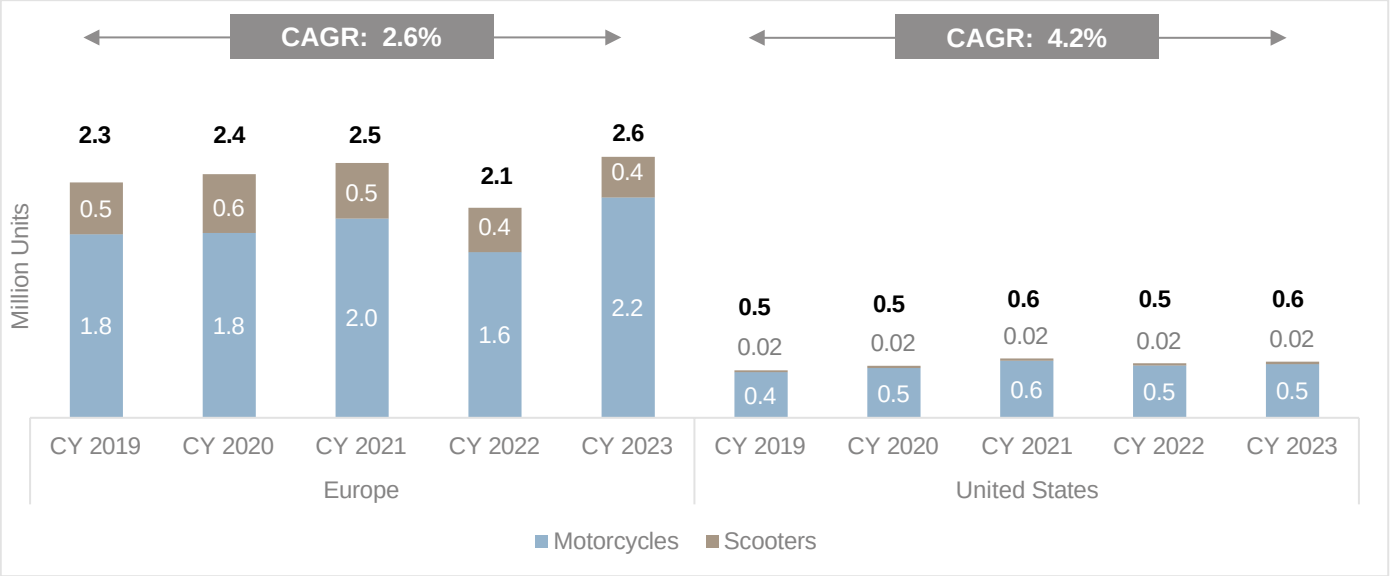
Europe and United States

The developed regions, United States and Europe form a relatively smaller portion the global two-wheeler demand at ~4% & 1% respectively. However, increased traction for premium lifestyle vehicles as well as EVs have helped the two-wheeler industry witness overall growth in these regions.

During CY2019-2023 period, two-wheeler sales rose at 2.6% and 4.2% CAGR for Europe and United States respectively. Rising customer preference for premium motorcycles as well as expanding two-wheeler dealership network aided the growth of two-wheelers.

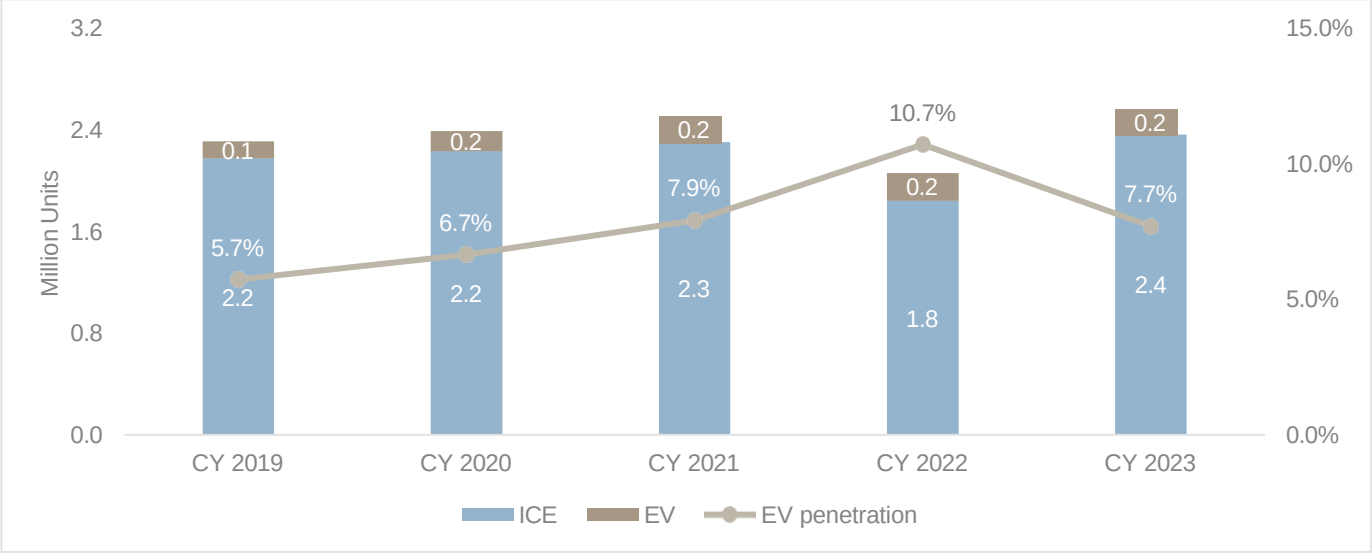
Both markets are predominantly motorcycle markets, wherein their sales contribute ~80% for Europe and 95%+ for US. In fact, within motorcycles, the premium motorcycles are the most preferred segment. Two wheelers are viewed as lifestyle vehicles in these countries rather than a primary mode of transport.

Europe and United States two-wheeler sales volumes trend



Source: MORDOR data

Europe EV penetration



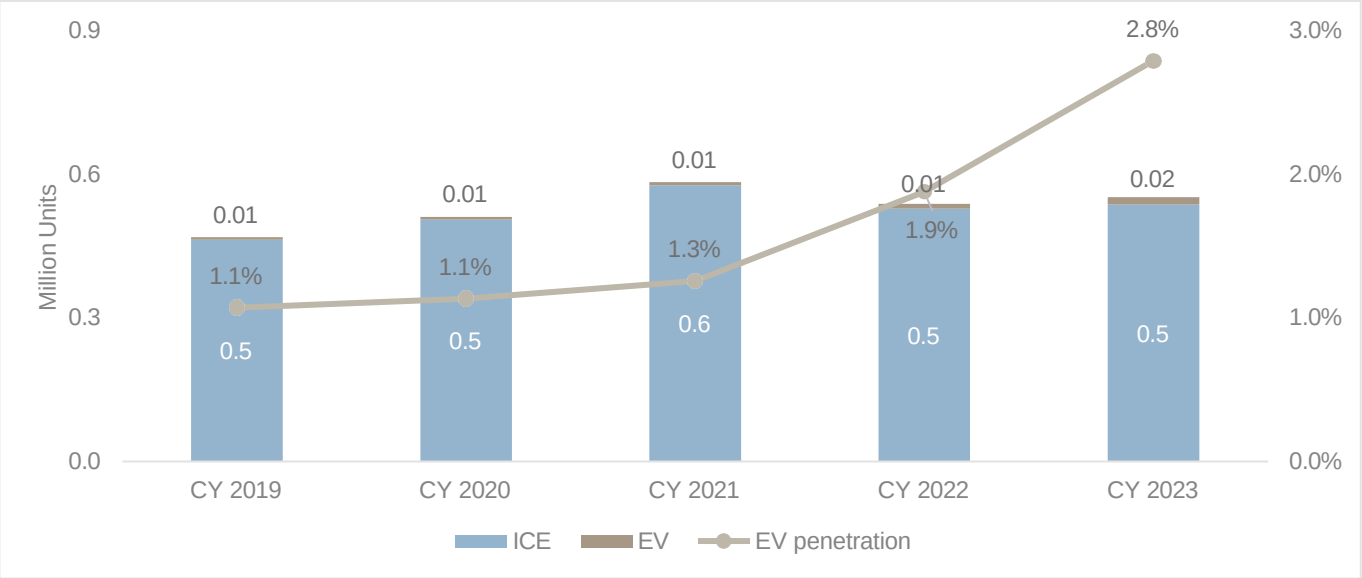
Source: MORDOR data

Within the scooters segment, the penetration of EVs is relatively higher and is growing further. For Europe, overall EV penetration within the two-wheelers, increased from 5.7% in CY2019 to 7.7% by CY2023. The e scooter sales increased at 4.0% CAGR and the EV penetration of e-scooter increased from 21.1% in CY2019 to 31.6% by CY2023. While e-motorcycle sales increased at a much faster rate of 29.8% CAGR from a low base to push EV penetration from 1.4% in CY2019 to 3.3% by CY2023.

Unlike Europe, EV penetration in United States in relatively lower given the preference for high end premium motorcycles. In Unites States, two-wheelers are primarily used as leisure vehicles and are often ridden on longer trips. Limited range, smaller size and lower power of EVs restricts their adoption.

However, during CY2019-2023, the EV penetration rose from 1.1% to 2.8% with EV sales recording a growth at 32.4% CAGR, albeit from a low base. Government push, rising awareness about the eco friendly vehicles backed this growth.

United States EV penetration



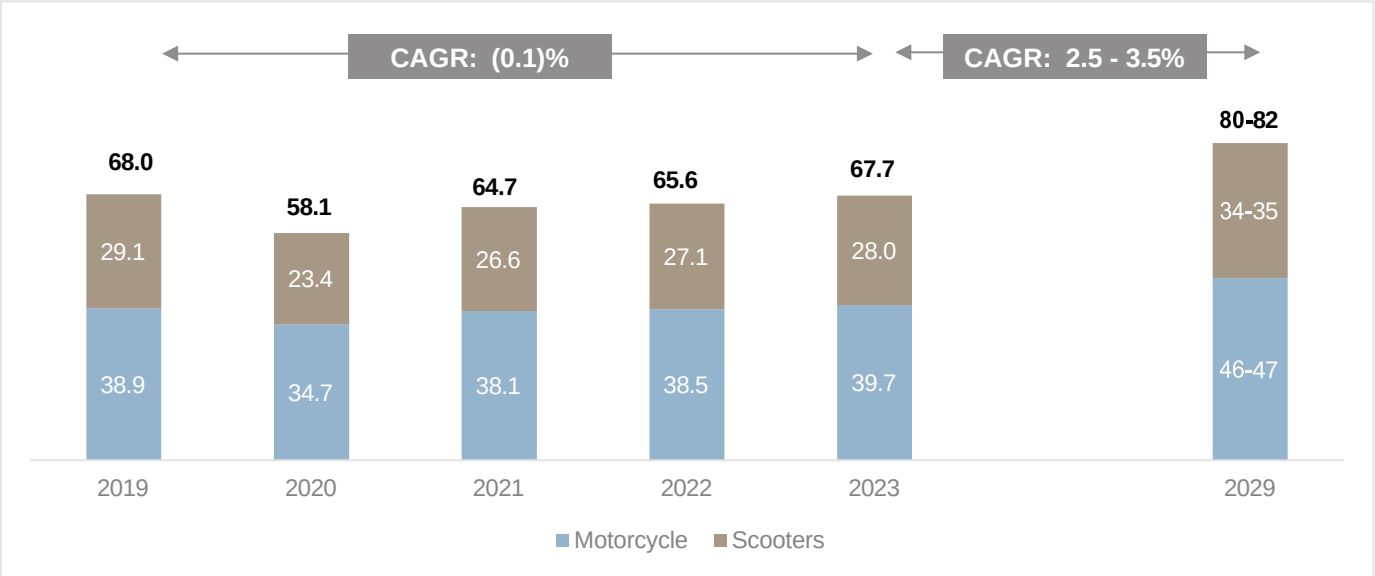
Source: MORDOR data

Global Industry Outlook

The global two-wheeler industry sales are expected to grow at an accelerated pace of 2.5-3.5% CAGR till CY2029 compared to a 0.1% CAGR contraction witnessed during CY2019-2023 period. Improvement in economic conditions, rising demand from underlying segments like e commerce, ride hailing coupled with increased traction for EVs to support this demand growth. Sales volumes are projected to reach 80-82 million levels by CY2029.

Rising electrification is projected to support faster growth of scooters at 3-4% CAGR. Motorcycles are projected to grow at a slightly slower pace of 2-3% CAGR from an elevated base.

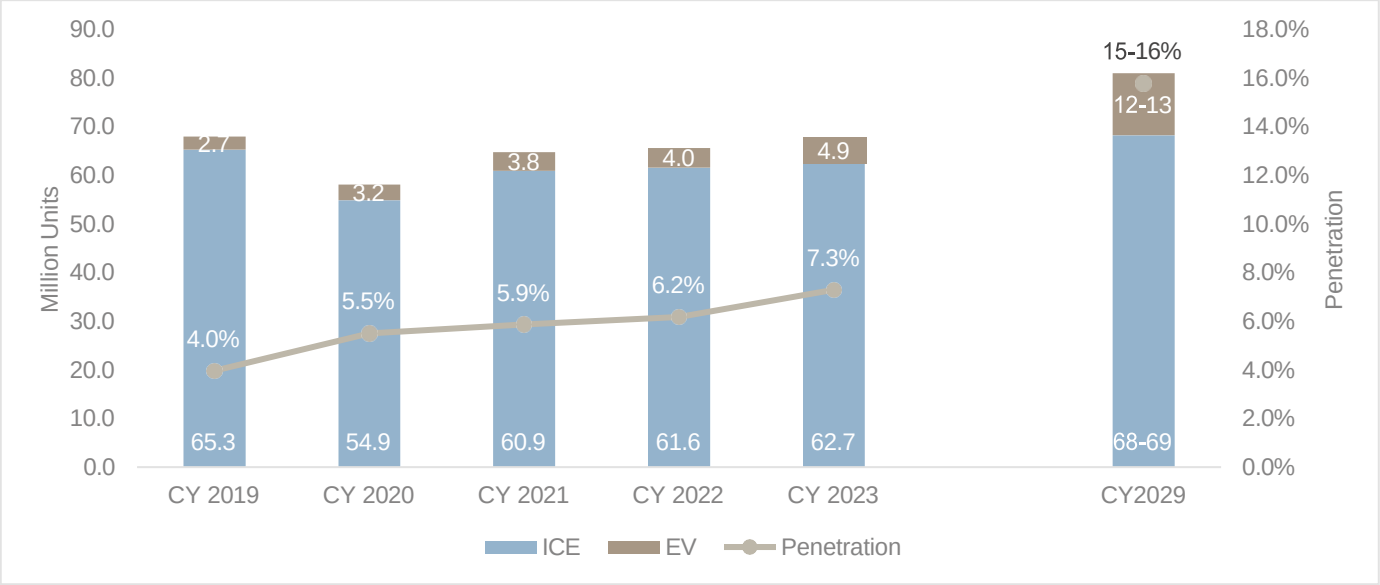
Global two-wheeler sales volumes outlook



Source: MORDOR data

Amidst the continued push from governments, increasing awareness, expanding vehicle portfolio is expected to provide a fillip to electrification growth going forward. Globally, the EV penetration is expected to reach 15-16% levels by CY2029.

Global two-wheeler sales powertrain split outlook



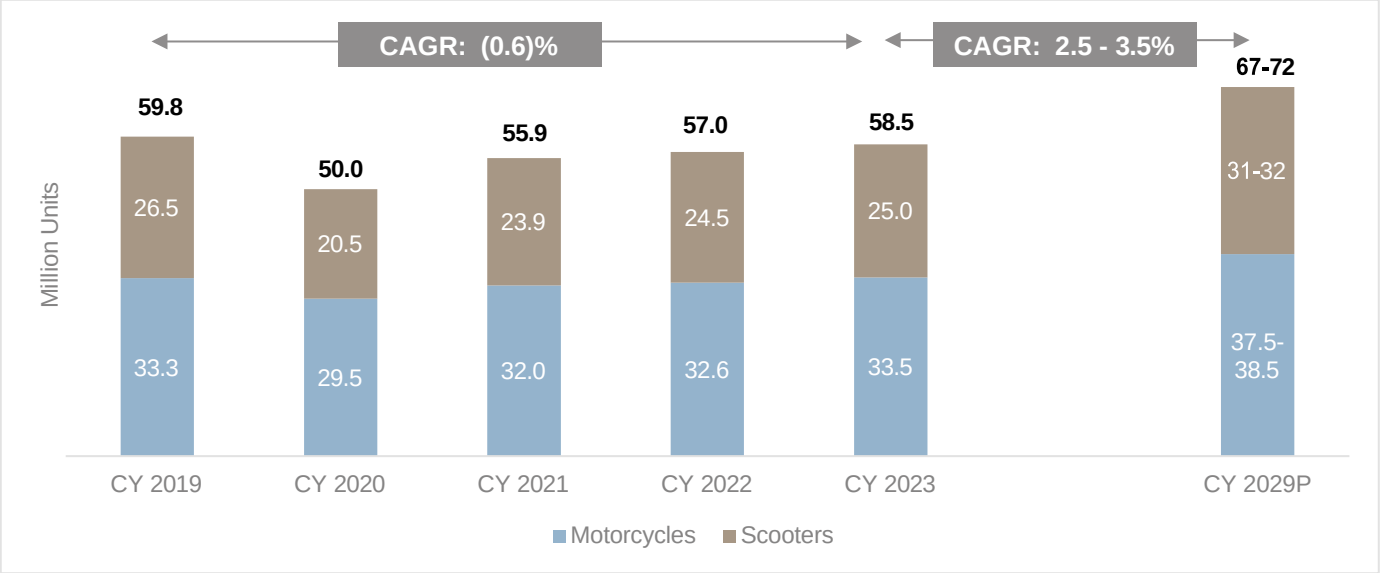
Source: MORDOR data

Asia Pacific Region (APAC)

One of the largest contributors to the global two-wheeler sales, is expected to grow at an accelerated pace going forward led by the expected improvement in macro-economic scenario- rising GDP, moderate inflation, expanding vehicle portfolio, rising electrification as well as continued demand for scooters. According to Mordor estimates, during CY2023-CY2029, two-wheeler sales in the APAC region are projected to grow at 2.5-3.5% CAGR and reach 67-72 million by CY2029.

Two-wheeler sales in China are expected to grow at 3-4% CAGR, while ASEAN countries like Vietnam (~3%), Philippines (~3%) and Malaysia (~4%) are projected to provide the added thrust. CRISIL estimates the Indian two-wheeler market to grow at ~7% CAGR till 2029 (fiscal 2030) which will provide further fillip to APAC region's growth going ahead.

APAC region two-wheeler sales volumes outlook



Source: MORDOR data

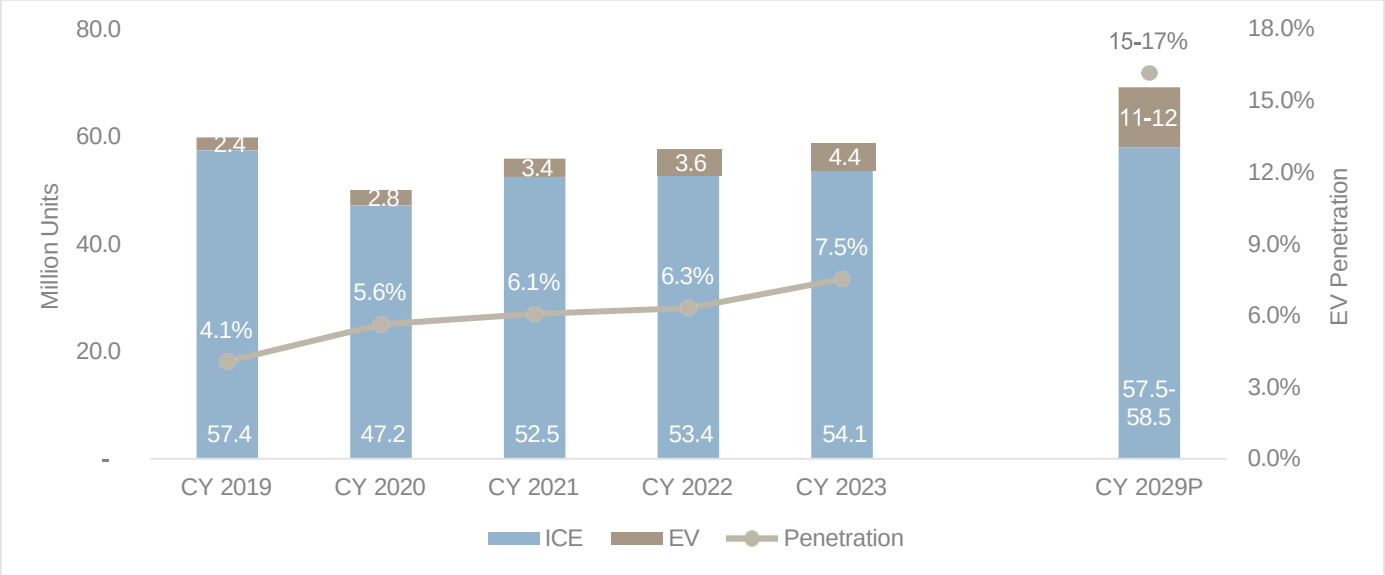
Within the two-wheeler industry, scooters are expected to clock a faster growth of 3.5-4.5%, supported by rising scooterisation in ASEAN countries as well as in India, while motorcycles are projected to witness slower 1.5-2.5% growth. In turn, the share of scooters is projected to reach 45-47% by CY2029 from 43% in CY2023.

The rising electrification, especially within the scooters segment, is expected to propel the faster growth of scooters going ahead. EV penetration within scooters is projected to rise from 16% in CY2023 to 28-30% by CY2029 for the APAC region.

In fact, EV penetration within the overall two-wheeler industry is projected to grow from 7.5% in CY2023 to 15-17% by CY2029 according to Mordor estimates. Government focus on ecofriendly transportation, EV incentives, increasing customer awareness, shifting customer preferences, expansion in EV portfolio, improving EV infrastructure, reducing global battery prices & in turn reducing EV acquisition costs are expected to provide thrust to electrification going ahead. Stricter emission norms and long-term electrification goals of the governments are other key factors providing the push to electrification levels.

The governments in these countries are aiding the EV adoption through regulations and incentives. India is offering incentives in the form of Electric Mobility Promotion Scheme, PLI – Auto components, chemistry cells, Phased manufacturing policy, Battery recycling and Charging infrastructure policy. China is promoting EV adoption with tax breaks, research funding, subsidies and New Energy Vehicle (NEV) mandates for OEMs. South Korean government is implementing regulations and incentives to encourage EV adoption as well as to increase the availability of charging infrastructure. These government initiatives are expected to back EV adoption over the longer run.

APAC region two-wheeler sales powertrain split outlook



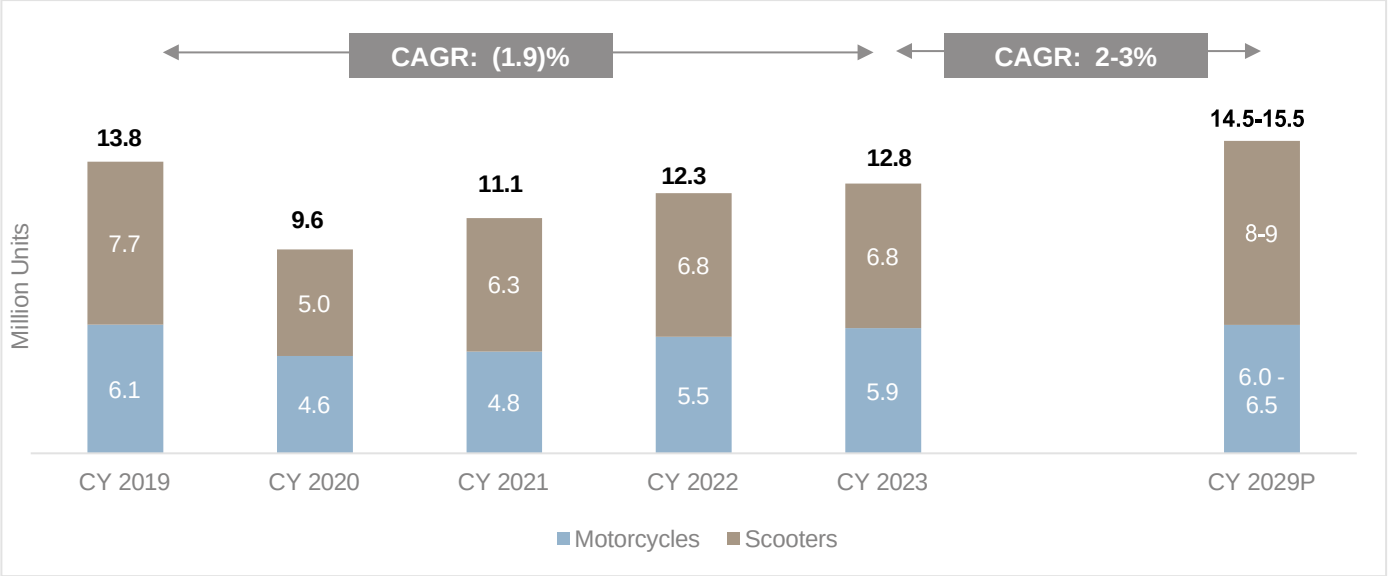
Source: MORDOR data

ASEAN – Part of APAC

ASEAN region, a sizeable contributor to APAC as well as global two-wheeler sales, is also expected to provide an accelerated push to the two-wheeler sales. Two-wheeler sales for the ASEAN region contracted at 1.9% CAGR till CY2023. Going ahead, the sales are projected to clock a 2-3% CAGR till CY2029 and reach volumes of 14.5-15.5 million by CY2029.

Vietnam, Philippines, Malaysia, Thailand are projected to spearhead this growth with ~3%, ~3%, ~4% and 2-2.5% projected CAGR growth with the largest contributor Indonesia (49% share in ASEAN sales) to also grow at ~2% CAGR till CY2029.

ASEAN region two-wheeler sales volumes outlook



Source: MORDOR data

According to IMF, the GDP growth is projected to accelerate for these countries going ahead with Vietnam- 6.4% average GDP growth till CY2029 vis a vis 5.1% witnessed in CY2019-2023 period, Philippines- 6.3% projected vs 3.1% till 2023, Malaysia- 4.2% projected vs 2.9% till 2023, Thailand- 2.9% projected vs 0.4% till 2023. Even for the dominant contributor Indonesia, GDP growth is projected to rise at an average rate of 5.1% during CY2024-CY2029 period, compared to 3.4% growth seen till CY2023. Inflation levels are also expected to improve for Indonesia from 2.8% between CY2019-23 to 2.5% going ahead till CY2024.

Thus, the estimated rise in disposable incomes in these countries is expected to support the accelerated growth of two-wheelers going ahead. The continued traction for last mile delivery and ride hailing applications will also back the growth of two-wheelers in the next few years.

This growth in two-wheelers will be backed by the projected rise in scooter sales. Scooter sales are expected to grow at 4.1% CAGR during CY2024-2029 period while motorcycles are expected to remain rangebound. The faster growth of scooters will further expand the share of scooters in the two-wheeler industry- from 54% in CY2023 to 58-60% by CY2023.

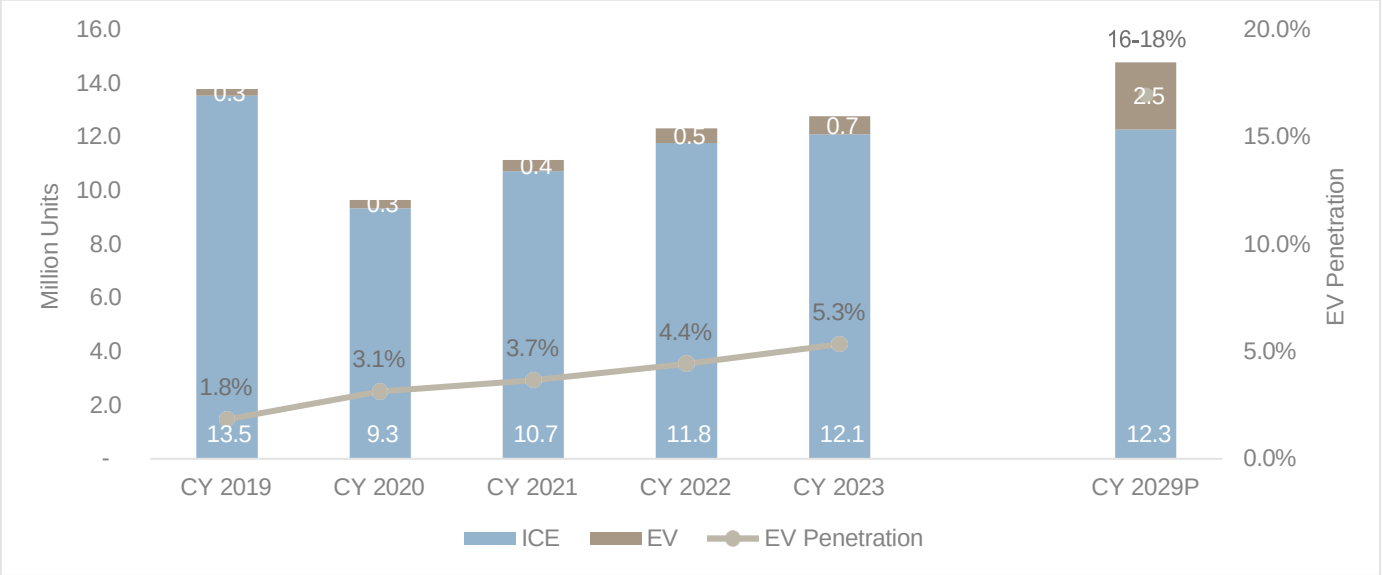
The sharp rise in e scooter sales at 23-24% CAGR will primarily drive the scooter sales going ahead. Government's focus on eco friendly vehicles, incentives for EV buyers, rising customer awareness, lowering acquisition costs and low operating costs to aid EV sales going ahead.

Over and above the incentives for the customers, the governments are also offering incentives in the form of tax breaks for EV manufacturers to set up their plants and are also promoting battery manufacturing capabilities, EV component manufacturing as well as expansion of charging infrastructure. Thailand has authorized the second phase of their EV package- EV3.5 for 2024-2027 period, has also reduced excise duty on EV batteries and announced a THB 24 billion subsidy for battery manufacturing. The proposed incentives in Vietnamese Ministry of Transport EV policy like no import tax, reduced VAT for EV buyers; extension of localization deadline in Indonesia; income tax rebate for local charging equipment manufacturers by the Malaysian government; such initiatives by the respective governments are expected to provide the thrust to electrification going ahead.

ASEAN countries also have tall EV targets with Thailand targeting 30% EVs by 2030, Vietnam targeting 10% of new vehicle sales as EVs by 2030 and a complete transition to EVs by 2050, Malaysia earmarking 15% EVs and 125,000 EV charging stations by 2030, Indonesia targeting 20% EV share in new vehicle sales by 2025 as well as 0.6 million EV vehicle production by 2030. In line with these targets, the respective governments are expected to continue to support the EV growth going ahead aiding e2W sales in the longer run.

According to Mordor, by CY2029, the EV penetration within the ASEAN region two-wheeler industry is expected to reach 16-18% from 5.3% in CY2023.

ASEAN region two-wheeler sales powertrain split outlook



Source: MORDOR data

Africa

Two-wheeler sales in Africa contracted at 0.9% CAGR during CY2019-2023 period. Going ahead, according to Mordor estimates, two-wheeler sales are projected to rise at 5-7% CAGR and reach volumes of 2.5-3.5 million vehicles by CY2029.

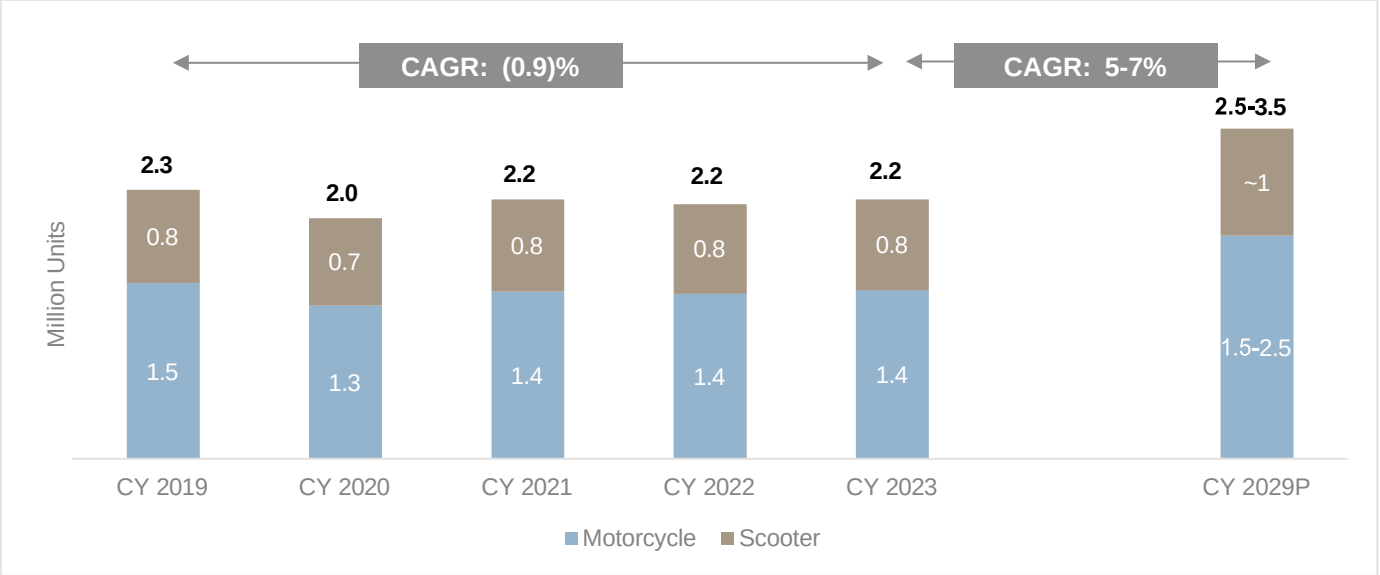
Nigeria which contributed 30% to Africa's two-wheeler sales, is expected to clock a healthy growth of 10-12% CAGR backed by projected improvement in macroeconomic scenario as well as continued demand for last mile delivery services and the commercial two-wheeler taxi (ride hailing). These services had a sizeable impact on the two-wheeler industry in Nigeria and is projected to continue growing in coming years.

Nigeria's GDP grew at 2% average CAGR during CY2019-2023. The GDP growth is expected to accelerate to 3.2% CAGR by CY2029, according to IMF estimates. This estimated improvement in incomes levels coupled with expanding vehicle portfolio in the country is expected to provide the thrust to the two-wheeler growth.

Moreover, the Nigerian Automotive Industry Development Plan (NAIDP), has paved the way for vehicle manufacturers to set up manufacturing plants in the country. The expected influx of international players as well as adoption of advanced manufacturing technologies is projected to drive the healthy growth of the two-wheeler industry going forward.

Morocco, another large contributor (5.5% share in 2023) has witnessed relatively faster growth in two-wheeler sales in the last 5 years. Going ahead, during CY2023-2029 period, two-wheeler sales are projected to grow at 8-10% CAGR led by improving macro-economic scenario, faster GDP growth, moderating inflation levels, increasing foreign direct investments, expanding vehicle portfolio, rising automotive production as well as shifting preference of younger customer base towards premium motorcycles.

Africa two-wheeler sales volumes outlook



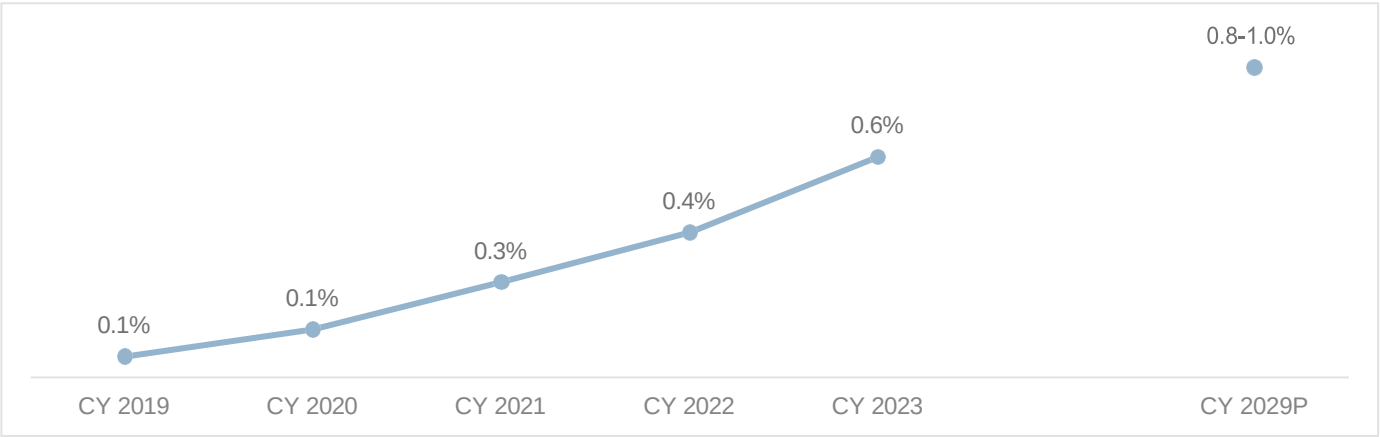
Source: MORDOR data

Africa market is predominantly a motorcycle market given the limited road infrastructure as well as lower customer affordability. Even going ahead, the motorcycle segment is projected to clock a faster growth of 7- 8% while the scooters segment is projected to grow at a relatively slower pace of 3.5-4.5%. In turn, the share of motorcycles is projected to increase from 65% in CY2023 to 67-69% by CY2023.

However, rising sales of e scooters is expected to back the growth of scooters going ahead.

The EV penetration levels are currently very low, however, some improvement in infrastructure, government focus on eco-friendly vehicles, rising awareness and popularity of EVs will support the growth of EV segment going ahead. As per Mordor estimates, e2W sales are projected to grow at 93-95% CAGR during CY2023-CY2029 period. In turn, the EV penetration is expected to reach 0.8-1.0% by CY2029. Penetration is projected to be higher in scooters- 2.0-2.5% range.

Africa EV penetration Outlook



Source: MORDOR data

Latin America

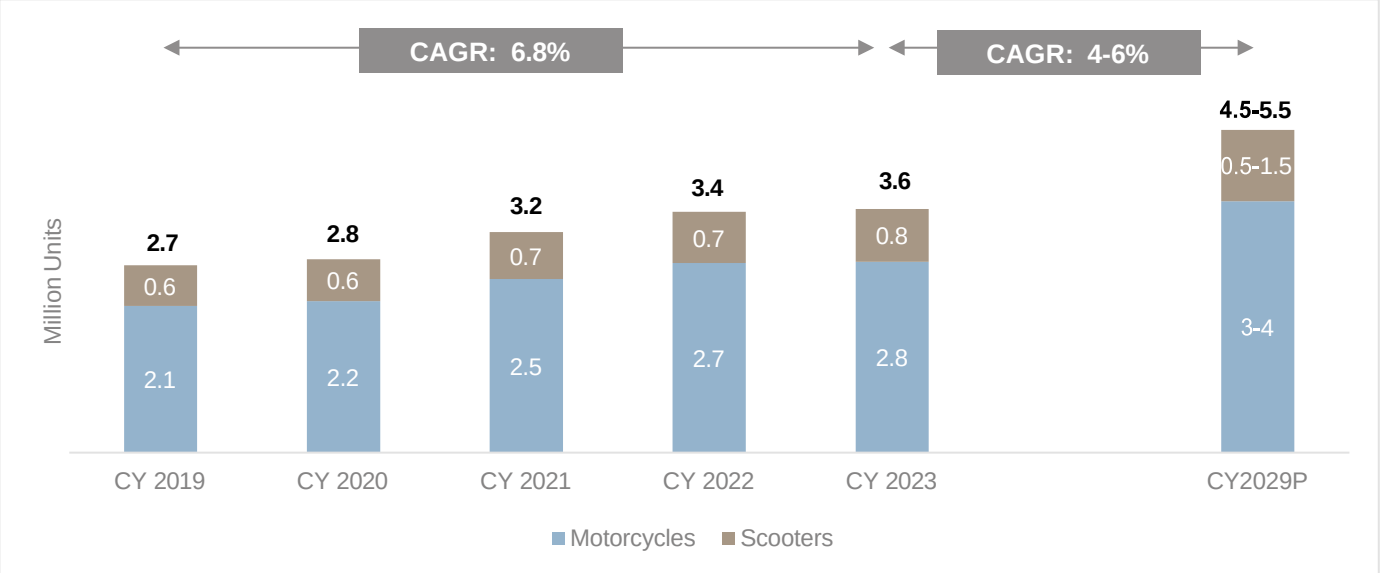
The two-wheeler sales in Latin America grew at a healthy pace of 6.8% CAGR between CY2019-2023. Even from the elevated base of 2023, sales are expected to continue their growth momentum and clock 4-6% CAGR till CY2029.

The largest contributor Brazil is projected grow at the fastest pace of 6%+ CAGR while other large contributors like Colombia and Argentina are also expected to grow at 4%+ CAGR aiding the region's sales.

This growth is expected to be backed by estimated improvement in macroeconomic scenario, rising demand for motorcycles for commercial purposes including e commerce, expanding vehicle portfolio offering sportier designs, increased power, enhanced comfort, and better handling as well as increasing manufacturing capacity. The rising preference for two-wheelers amidst the increased congestion especially in urban areas and escalating fuel costs to further aid the industry growth.

Motorcycles are projected to clock 4.5-5% CAGR growth while scooters are expected to witness slightly faster growth at 5-5.5% CAGR. The projected increase in electrification is expected to provide an added push to the scooter sales.

Latin America two-wheeler sales volumes outlook



Source: MORDOR data

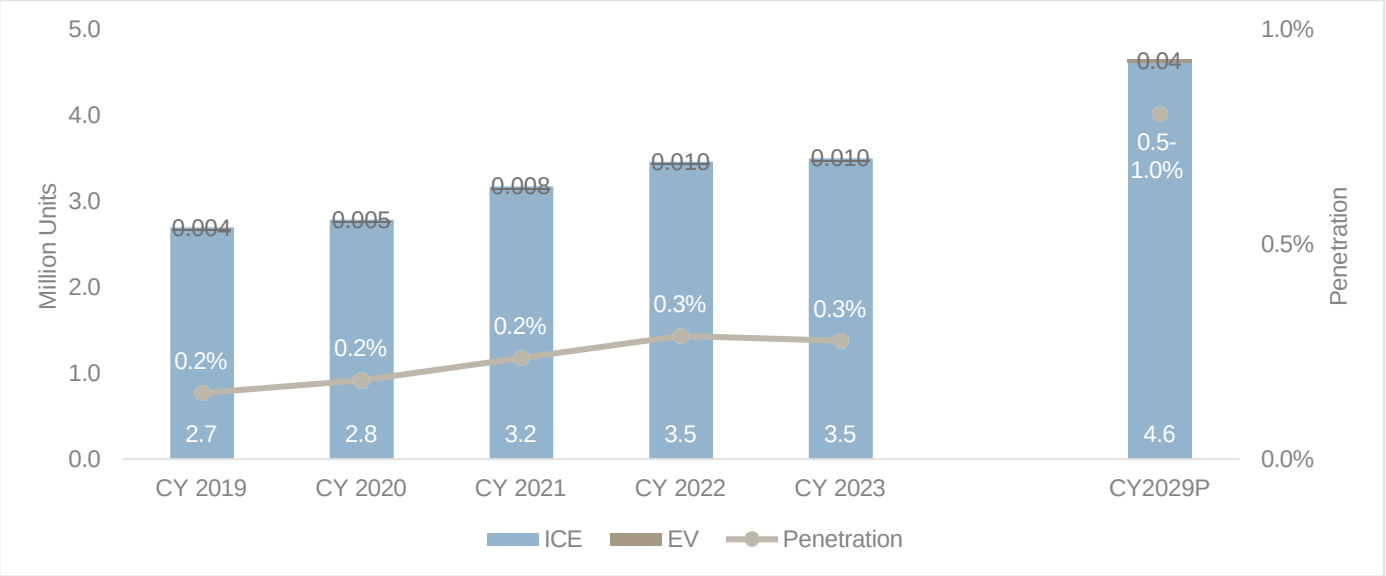
The EV penetration within the two-wheeler industry is relatively low at 0.3% level as of CY2023. However, the same is expected to grow to 0.5-1.5% levels by CY2029.

The expanding EV portfolio, entry of new age players, emergence of new business models like short term rental of e scooters coupled with continued government support, emission regulations, charging infrastructure to support the electrification going ahead. Rising awareness and concern for environmental sustainability and cost-effective transportation options are expected to provide an added support to the EV segment growth.

Electrification is expected to be faster in scooters amidst lower acquisition costs compared to e bikes as well as higher model options. EV penetration within scooters is projected to increase from 1.2% in CY2023 to 3-3.5% levels by CY2029.

The penetration of EVs in motorcycles is also expected to be 0-0.2% by CY2029 from insignificant levels as of CY2023.

Latin America powertrain split Outlook

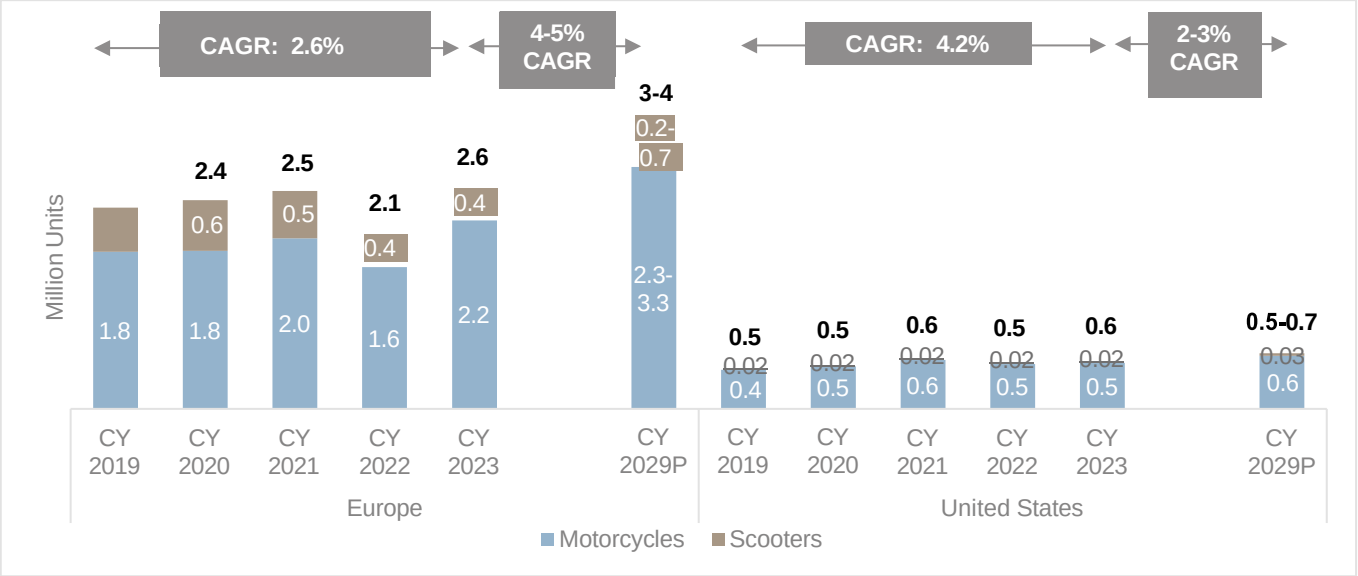


Source: MORDOR data

Europe and United States

Two-wheeler sales in Europe grew at 2.6% CAGR during CY2019-2023 period. Going ahead, the Europe two-wheeler market is projected to grow at a faster rate of 4-5% CAGR till CY2029.The growing requirement for two-wheelers for the last mile delivery services as well as increased need for efficient vehicles amidst the rising congestion and limited parking spaces will aid this demand growth. The shifting customer preference, especially amongst the young buyers, for premium motorcycles and electric vehicles will further support the industry growth going forward.

Europe and United States two-wheeler sales volumes Outlook

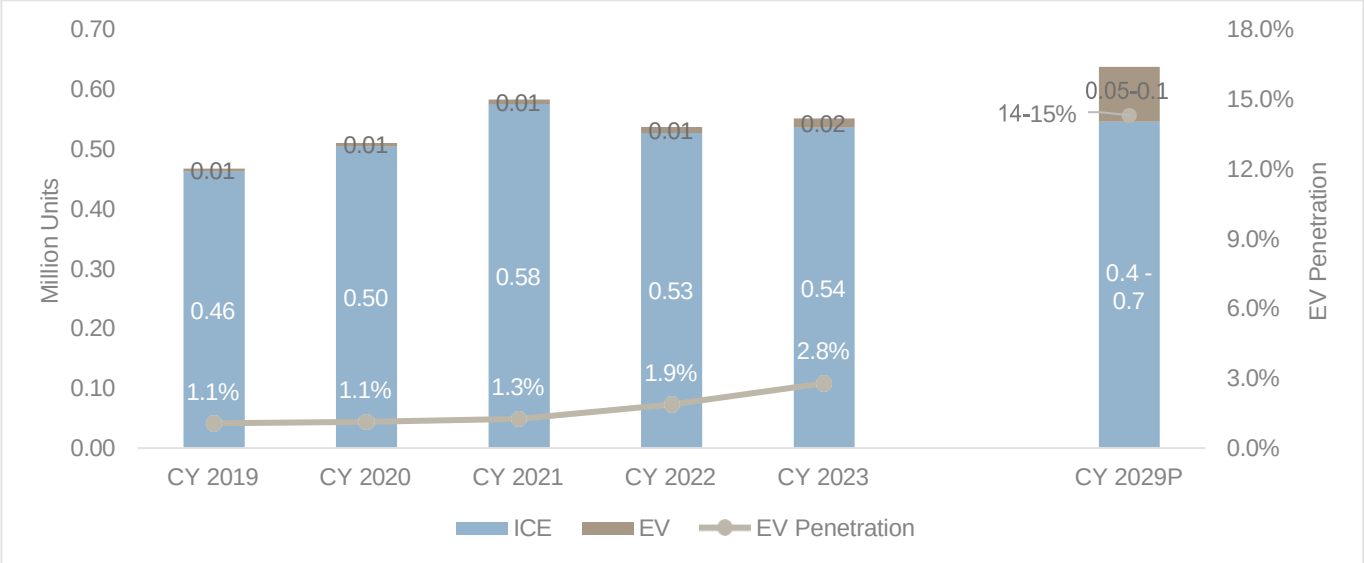


Source: MORDOR data

The two-wheelers industry in United States is projected to grow at 2-3% CAGR during CY2023-2029 period. The changing customer preferences from cars towards the lifestyle vehicles- the premium touring motorcycles is backing the two-wheeler demand growth in the country and is expected to continue to support the growth going forward. Additionally, two-wheeler dealership expansion as well as the expansion in vehicle portfolio, especially of high-performance touring motorcycles is expected to provide further impetus to the segment. However, the smaller scooters segment (4% contribution in CY2023) is projected to grow at a faster pace, off the low base, at 4-5% CAGR compared to 2-3% CAGR projected for the dominant motorcycles segment.

The rise in traction for eco friendly electric two-wheelers, especially amongst the youngsters is another factor backing the demand growth for United States. e2Ws are projected to clock a much faster growth at 34-36% CAGR going forward, albeit from a low base.

United States EV penetration Outlook

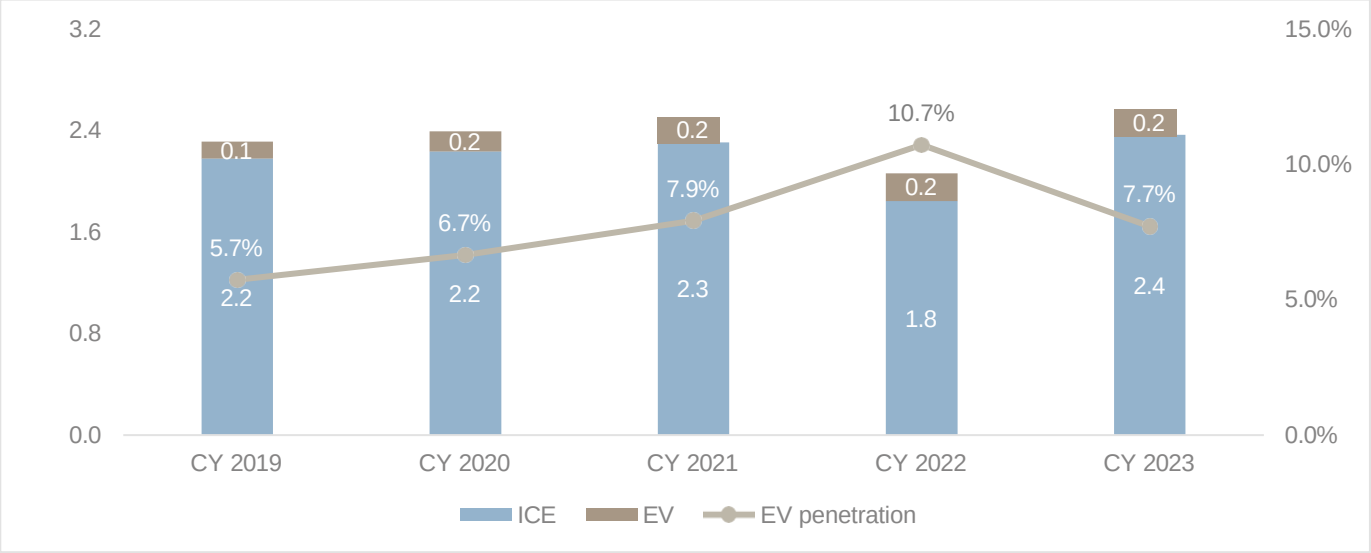


Source: MORDOR data

According to Mordor projections, the EV penetration in United States is estimated to reach 13-15% by CY2029 from 2.8% seen in CY2023. The smaller scooters segment is expected to witness faster growth in EV adoption from 7.4% in CY2023 to 28-30% by CY2029 while the EV penetration in larger motorcycles segment is projected to reach 13-15%.

The increased OEM focus on electric vehicles amidst growing stringency in emission standards, expanding EV portfolio, push from global EV players, government incentives and tax benefits are expected to aid the EV adoption going forward. The US government's focusing on creating a convenient, dependable EV charging network with US Department of Transportation and Energy funding various programs to improve the robustness and dependability of public charging network, as well as programs developing EV technologies will be factors aiding the EV adoption.

Europe EV penetration Outlook



The EV penetration in Europe, was relatively higher at 7.7% in CY2023. A further expansion is projected going ahead, especially, in scooters. Government push and rising awareness are expected to drive the growth of EVs going ahead. Moreover, European parliament's decision to outlaw the sale of ICE passenger vehicles by 2035, and its commitment to reduce emissions in European Union by at least 55% by 2030, is paving the way for further expansion of EVs within the two-wheeler industry.

According to Mordor projections, EV sales within scooters are expected to grow at a healthy pace of 15-17% CAGR and penetration levels are projected to reach 57-59% by CY2029. While, from a lower base, e- motorcycles are projected to clock a faster growth of 37-39% and the penetration levels to reach in 17-19% range by CY2029.

Overall, e2Ws are projected to grow at 25-27% CAGR, pushing the penetration levels to 23-25% by CY2029.

5. Review and outlook on the Global 4W Industry

Review of the global PV industry (CY19 to CY23)

Global passenger car industry from 2019 to 2023 saw many ups and downs, characterized by soaring highs, plummeting lows, and a cautious shift towards a new normal. This period witnessed a pre-pandemic boom fuelled by rising disposable incomes and technological advancements, followed by a pandemic-induced slump that challenged the industry's very foundation. As the dust settles, a nascent recovery is underway, intertwined with the transformative rise of electric vehicles (EVs).

The year 2019 marked a pinnacle moment for the global passenger car industry driven by a confluence of factors. Rising disposable incomes, particularly in developing economies like China and India, empowered a growing middle class to invest in personal vehicles. Easy access to credit further facilitated car purchases, fuelling demand across all segments. Additionally, advancements in automotive technology, such as improved fuel efficiency and the introduction of driver-assistance features, enticed consumers seeking a blend of performance and safety. This period painted a rosy picture for the industry, with manufacturers optimistic about sustained growth trajectories.

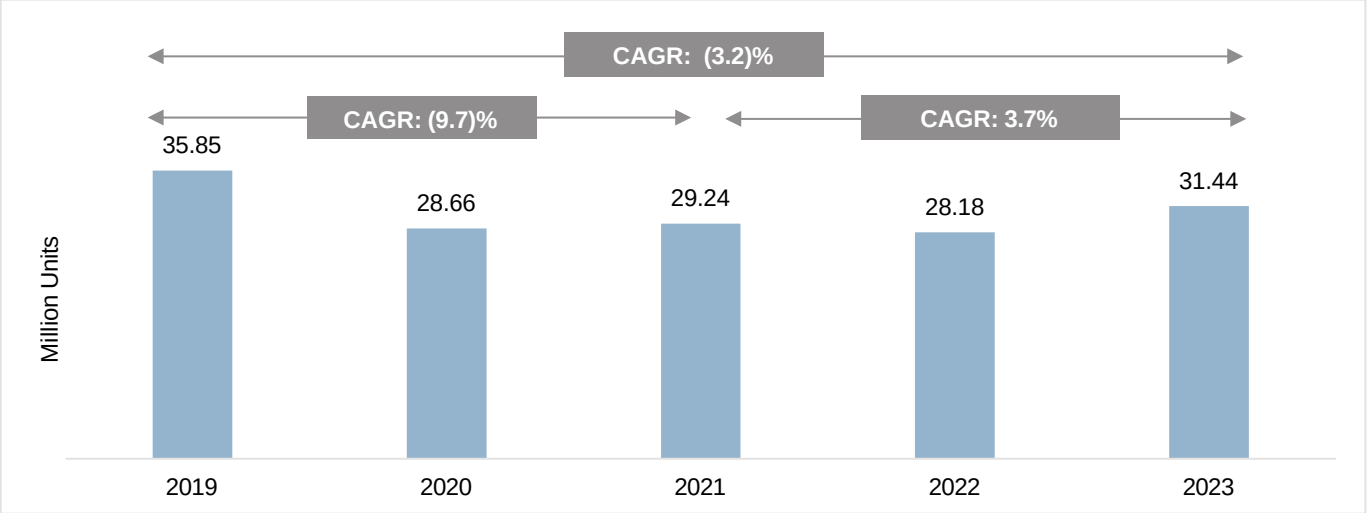
However, the sudden emergence of COVID-19 in 2020 proved to be a major disruption. Lockdowns and social distancing measures severely impacted consumer confidence and led to a significant decline in sales. This was further exacerbated by disruptions in global supply chains, which caused critical component shortages, particularly semiconductors. These chip shortages continued to be a major challenge throughout 2022 and 2023, hindering carmakers' ability to meet production targets and fulfil existing orders.

Despite these headwinds, the industry also witnessed the rise of a promising trend – the increasing popularity of electric vehicles (EVs). Driven by factors like rising fuel prices and growing environmental concerns, consumers showed a significant shift in interest towards EVs. This was further bolstered by government incentives and subsidies offered in many countries to promote EV adoption. As a result, the EV segment experienced remarkable growth during this period, emerging as a bright spot in an otherwise challenging market. This trend suggests a potential long-term shift in consumer preferences towards more sustainable and fuel-efficient vehicles.

Overall, the global passenger car industry from 2019 to 2023 has undoubtedly undergone a period of significant transformation. The pandemic's impact was undeniable, but the industry has demonstrated resilience and is adapting to a new reality. As the market recovers, electrification and advancements in autonomous driving technologies are poised to become the driving forces shaping the future of the passenger car industry. This is not just a recovery; it's a shift in gears towards a more sustainable and technologically advanced automotive landscape. The road ahead remains riddled with uncertainties, but the industry is positioned to navigate them with a renewed focus on innovation, resilience, and a commitment to a cleaner future.

Historic production development (CY19-CY23)

Review of global PV sales volumes

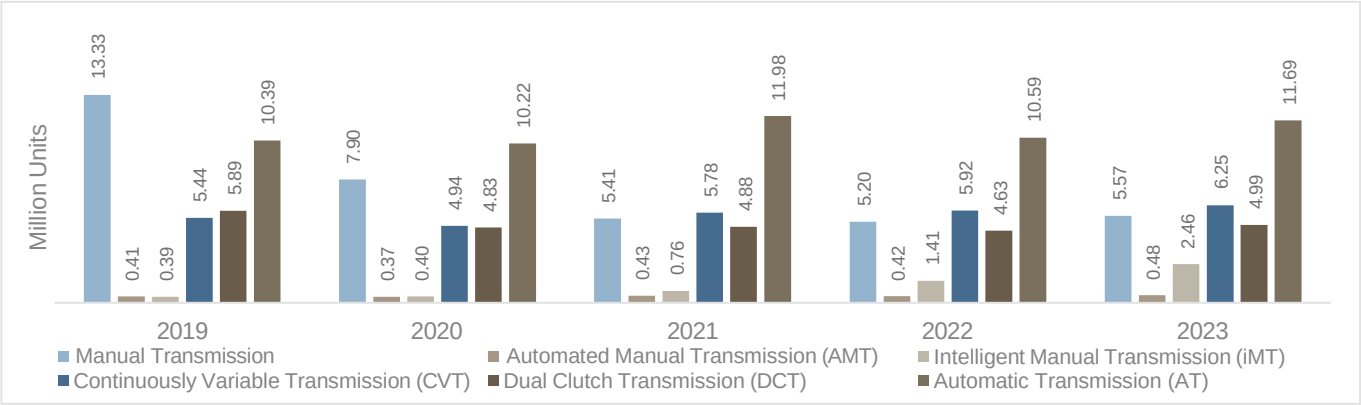


Note: Above figures comprise of sales for United States, Europe, and ASEAN countries
Source: Mordor Intelligence, CRISIL MI&A

Passenger car sales globally boomed in 2019, then plummeted during the COVID-19 pandemic (2020-2021). A tentative recovery began in 2022-2023, as the markets started opening up gradually post COVID-19 impact. Between 2019-21, global passenger vehicles witnessed a CAGR of (9.7)%, further, between 2021-23, industry witnessed a CAGR of 3.7% with volumes reaching up to 31.44 million units. Overall, between 2019 to 2023, that was a mixture of major downturns and gradual upticks, industry witnessed a CAGR of (3.2)%.

As the challenges due to pandemic were immense that put the industry in a spot, there were also a few drivers that kept the industry moving. The rise of a strong middle class with growing disposable income, fuelled a surge in demand for new cars, particularly SUVs due to their perceived practicality and status symbol appeal. Automakers focused on cost-effective ways to improve fuel efficiency and safety features, catering to budget-conscious consumers in both developed and emerging markets. This led to a rise in popularity of smaller, more efficient cars. And advancements in in-vehicle technology like navigation, entertainment systems, and driver-assistance features became a key differentiator for carmakers, attracting tech-savvy consumers.

Review of global PV sales volumes basis transmission type



Note: Above figures comprise of sales for United States, Europe, and ASEAN countries

Source: Mordor Intelligence, CRISIL MI&A

The internal combustion engine may have dominated the roads for over a century, but the way it delivers power to the wheels is undergoing a fascinating transformation. Once relegated to a niche segment, automatic transmissions are experiencing a global surge in popularity, driven by a fundamental shift in consumer preferences.

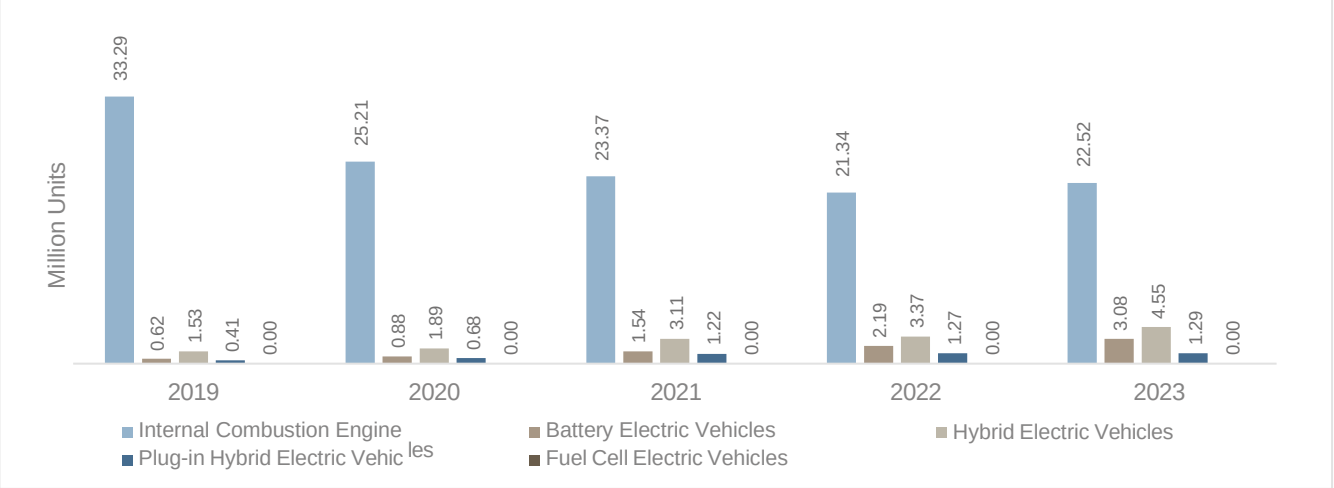
For decades, the Manual Transmission (MTs) reigned supreme, particularly in markets where fuel efficiency was paramount. Its simple design and direct connection between driver and engine offered exceptional control and minimized energy loss. However, several factors have conspired to dethrone the once-unmatched Manual Transmission (MTs):

The Rise of Urbanization: The constant stop-and-go driving of urban environments is far less suited to the constant clutch modulation and gear changes required by Manual Transmission (MTs). Automatic transmissions, with their seamless operation, offer a far more comfortable and less stressful driving experience in these conditions.

The Comfort Factor: Consumer preferences are tilting towards convenience and a smoother driving experience. The ease of use and minimal driver intervention offered by automatics are increasingly valued, especially by a growing demographic of older drivers who may find the physical demands of Manual Transmission (MTs) less appealing.

Technological Advancements: Automatic transmissions haven't remained stagnant. Advancements in technology have led to significant improvements in their fuel efficiency, making them a more viable option for eco-conscious drivers. Additionally, the development of new automatic transmission types, like Continuously Variable Transmissions (CVTs) and Dual-Clutch Transmissions (DCTs), offer a wider range of driving experiences, catering to both comfort-seeking individuals and performance enthusiasts.

Review of global PV sales volumes basis powetrain type

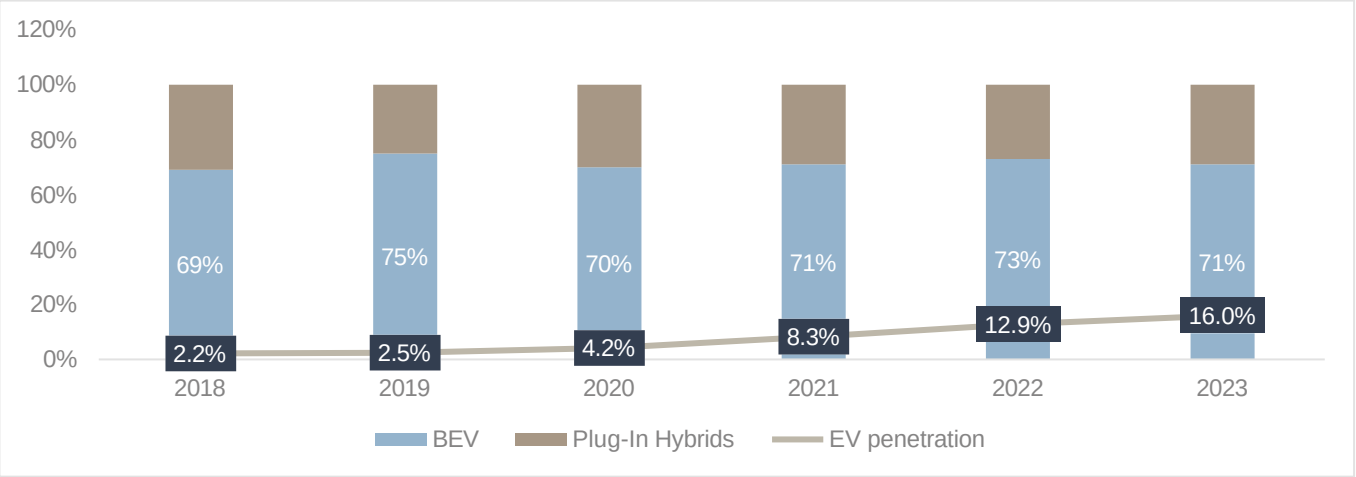


Note: Above figures comprise of sales for United States, Europe, and ASEAN countries
Source: Mordor Intelligence, CRISIL MI&A

The global passenger car industry is undergoing a seismic shift, fuelled by a growing urgency to address environmental concerns and achieve sustainable transportation solutions. The once-dominant internal combustion engine (ICE) is facing increasing competition from a diverse range of alternative powertrains, fundamentally altering the landscape of the industry.

For over a century, ICE vehicles reigned supreme. Their established infrastructure of gas stations and familiarity to consumers offered unmatched convenience and freedom of movement. This dominance fuelled a global car manufacturing industry focused on optimizing ICE technology for performance, efficiency, and affordability. However, the tide began to turn with growing scientific consensus on the detrimental impact of greenhouse gas emissions from fossil fuel combustion. Stringent emission regulations and rising public awareness about climate change forced the industry to confront the environmental cost of its core product.

The Electric Revolution



Source: EV-volumes.com, CRISIL MI&A

Battery electric vehicles (BEVs) emerged as the vanguard of the electric revolution. Their zero-tailpipe emissions and silent operation offered a compelling alternative to polluting ICE vehicles. Governments around the world started offering subsidies and incentives for BEV purchases, further accelerating their adoption. This spurred significant investments from car manufacturers in research and development, leading to advancements in battery technology, range improvement, and charging infrastructure development. While initial concerns about driving range and charging availability remain hurdles, the industry is actively addressing them through advancements in battery density and the expansion of charging networks. Major car manufacturers are now dedicating a significant portion of their resources to BEV development, recognizing their potential as the future of personal transportation.

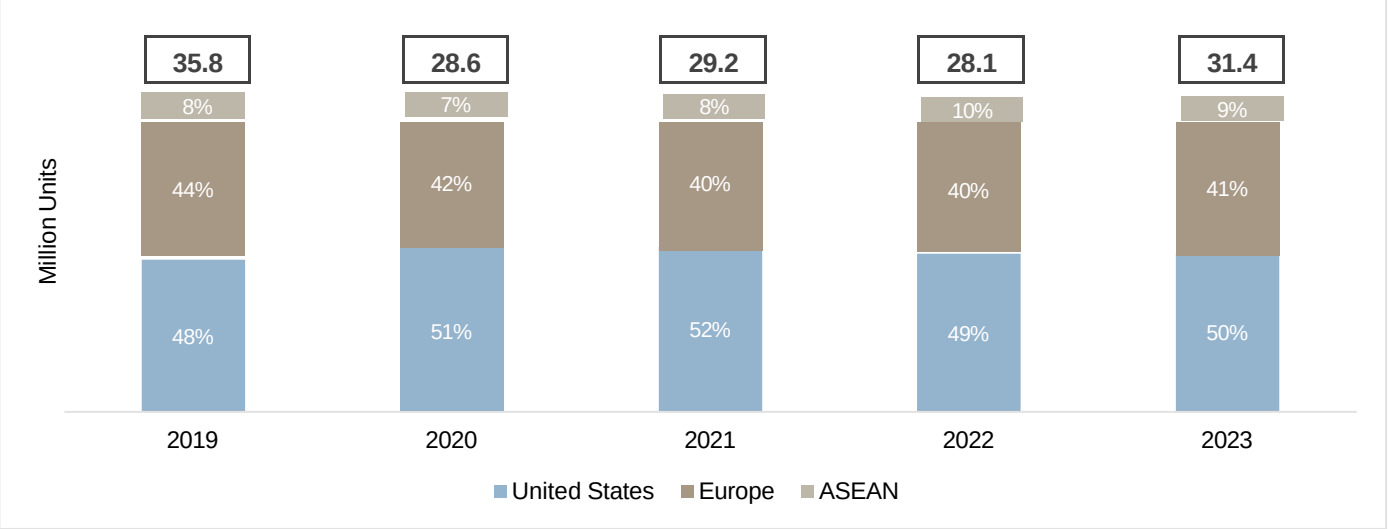
Hybrid electric vehicles (HEVs) and plug-in hybrid electric vehicles (PHEVs) offer a bridge between the familiar ICE technology and the future of electric mobility. HEVs combine an electric motor with a gasoline engine, allowing for electric-only driving at low speeds and utilizing the gasoline engine for longer journeys. PHEVs operate similarly but boast larger battery packs that can be charged from an external source, enabling extended electric-only driving range compared to HEVs. These hybrid options cater to consumers who are hesitant to fully commit to BEVs due to range anxiety but still desire the environmental benefits of electric propulsion. The industry is constantly refining hybrid technology, focusing on improving electric range and reducing dependence on gasoline engines.

Fuel cell electric vehicles (FCEVs) present a long-term vision for clean transportation. They utilize hydrogen fuel cells to generate electricity, emitting only water vapor. While FCEVs boast extended range and rapid refuelling times similar to ICE vehicles, their widespread adoption faces significant challenges. The lack of widespread hydrogen refuelling infrastructure and the high cost of FCEV technology are major hurdles. Nevertheless, the industry continues research and development efforts to bring down costs and build hydrogen infrastructure, recognizing FCEVs' potential for long-distance travel and heavy-duty applications.

The future of passenger car powertrains is unlikely to be dominated by a single technology. Instead, a multi-pronged approach catering to diverse needs and regional priorities is expected.

Global passenger cars sales by geography type

Review of global PV sales volume share by gegraphy type

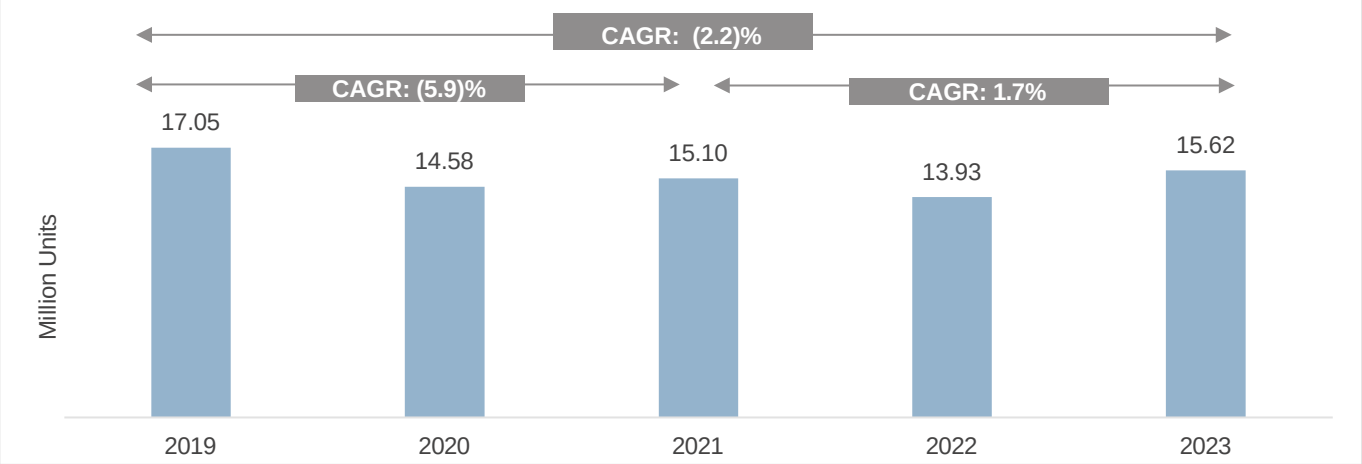


Source: Mordor Intelligence, CRISIL MI&A

The narrative of global passenger car sales from 2019 to 2023 unfolds differently depending on the region. However, a common thread across all regions is the anticipated surge in electric vehicle (EV) adoption. Government incentives and growing environmental concerns are likely to accelerate EV sales, shaping the future of the global passenger car market. While the pace of this shift might vary by region, EVs are expected to be a dominant force in the years to come.

United States

Review of United States PV sales volumes



Source: Mordor Intelligence, CRISIL MI&A

The United States passenger vehicle industry has experienced a period of significant fluctuation between the years 2019 and 2023. The year 2019 witnessed a period of unprecedented prosperity for the industry, with sales exceeding 17 million units. Consumer confidence thrived on a robust economy and advantageous interest rates.

Easy access to affordable financing further stimulated demand, with a particular emphasis on SUVs, which dominated sales figures.

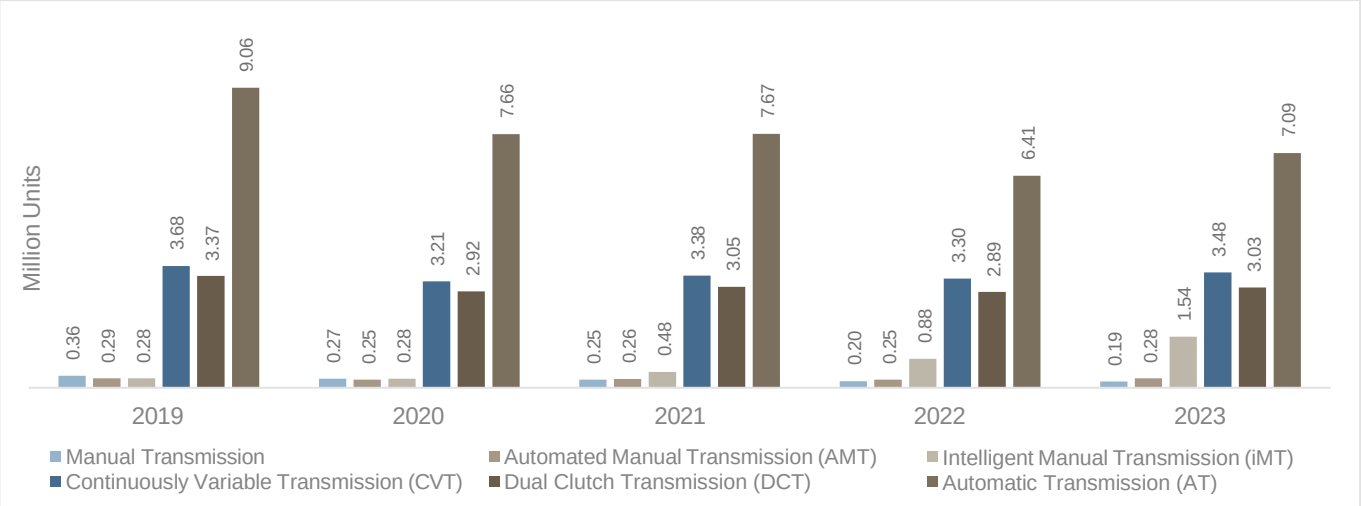
Consumer preferences moved decisively towards SUVs fuelled by practicality and perceived safety. This coincided with a growing interest in electric vehicles (EVs) due to rising fuel prices, environmental concerns, and increased range of options. The pandemic caused a sales dip in 2020, and ongoing chip shortages throughout 2022 and 2023 limited inventory and potentially inflated prices. Automakers responded by prioritizing production of high-demand SUVs and trucks, while also investing heavily in developing new EV models to stay competitive. The luxury car market remained relatively stable, and the impact of these trends varied slightly across different regions within the U.S. The United States government has been promoting the use of electric vehicles through various incentives and subsidies, which has led to a surge in demand for these vehicles.

Between 2019-21, industry witnessed a CAGR of (5.9)% due to pandemic impact, which later relatively improved to a CAGR of 1.7% between 2021-23 with volumes reaching up to 15.6 million units. Overall, between 2019-23, industry witnessed a CAGR of (2.2)% with volumes still not matching 2019 levels of 17 million units.

The United States is one of the major transmission technology markets; therefore, players are extensively focusing on enhancing their offerings through integrating innovative transmission technology. For instance,

- In February 2024, ZF intends to invest USD 500 million in Gray Court, US, establishing its inaugural North American flex manufacturing site for traditional ICE and e-mobility technologies.
- In June 2023, Lucid Motors, a United States-based electric vehicle manufacturer, announced a long-term agreement worth USD 450 million with luxury brand Aston Martin to supply electric vehicle transmission powertrain and battery systems for the British sports car maker's new EV platform.
- In June 2023, Toyota announced that they had filed a patent application in the United States to launch their flagship fake manual transmission for electric cars to provide an add-on feature for people who like shifting gears in their gasoline-powered cars.

Review of United States PV sales volumes by transmission type



Source: Mordor Intelligence, CRISIL MI&A

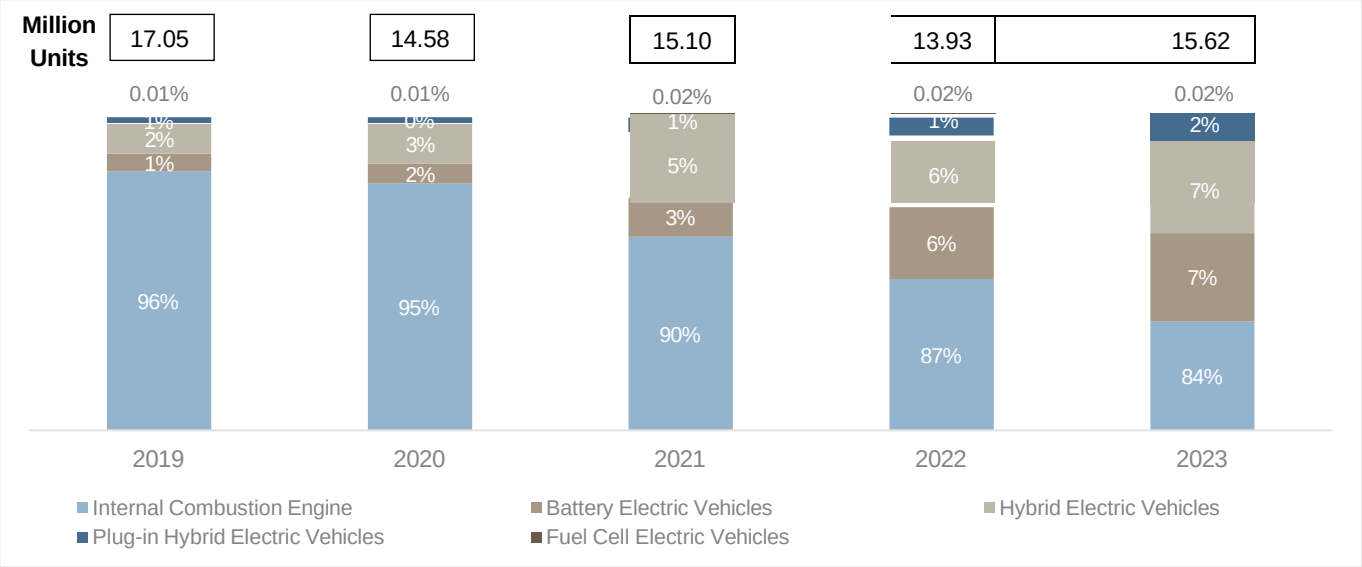
The U.S. passenger car industry has witnessed a significant shift in transmission preferences over the past five years (2019-2023). Following are some details for the same:

Automatic Dominance: Automatic transmissions (AT) reigned supreme in 2019, capturing majority of the market share. Their ease of use, comfort, and growing adoption in SUVs solidified their position. Manual transmissions (MT) continued their decline, accounting for a small but loyal segment, typically sought after by driving enthusiasts or budget-conscious buyers. On the other hand, iMT (Intelligent Manual Transmission) was a nascent technology in 2019, with minimal adoption in the U.S. market.

The COVID-19 pandemic disrupted the entire industry, with transmission trends mirroring overall sales fluctuations. Manual transmissions continued their downward trajectory, with sales hovering around 2% of the market share. The convenience of automatics and lower gas prices during this period further marginalized MTs.

Continuously variable transmissions (CVTs) experienced a steady rise in popularity, particularly in smaller and fuel-efficient cars. Their smooth driving experience and potentially better fuel efficiency in city driving resonated with some consumers. DCTs remained a niche player, primarily featured in performance-oriented vehicles due to their sporty driving feel and faster gear changes. However, their higher cost and complexity limited their wider adoption. iMT saw limited growth during this period. While it offered a potential bridge between the convenience of automatics and the engagement of MTs, its lack of widespread adoption by major manufacturers restricted its market share. However, 2022 onwards, iMT saw an increase in its share which further continued its trend in 2023 as well. On the other hand, AMTs remained as one of the low contributors in the overall market due to some challenges in its widespread adoption in US markets.

Review of United States PV sales volume share by powertrain type



Source: Mordor Intelligence, CRISIL MI&A

The U.S. passenger car market witnessed a dramatic shift towards electrification between 2019 and 2023. This transformation, driven by a confluence of factors, reshaped the landscape and challenged the dominance of traditional internal combustion engine (ICE) vehicles.

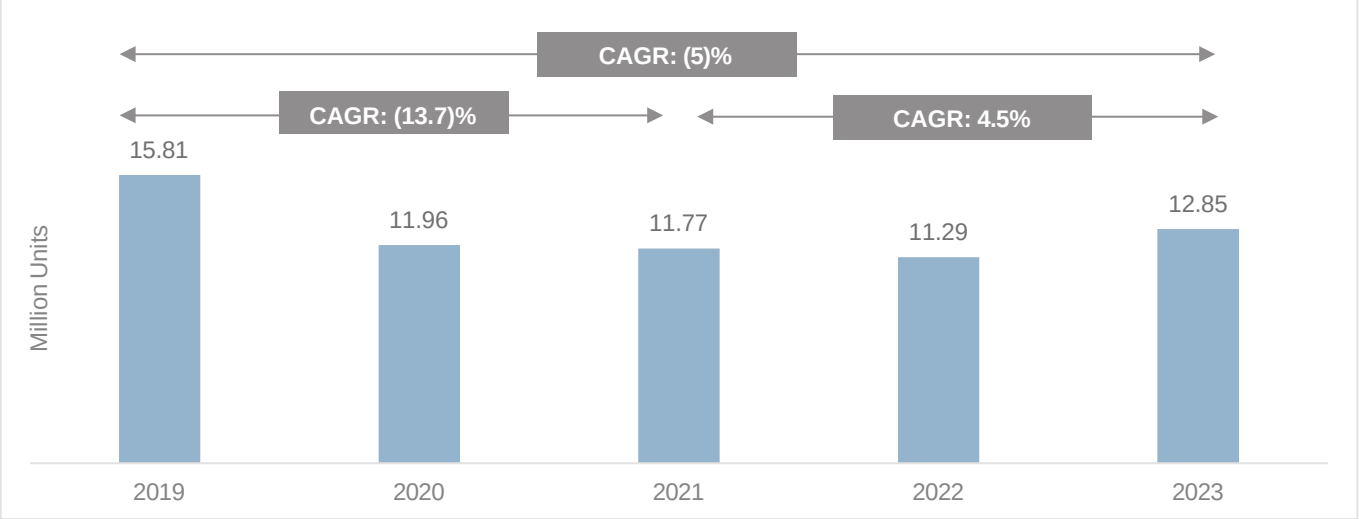
Environmental Concerns and Regulations: Growing awareness of climate change and its link to transportation emissions spurred a global movement towards cleaner alternatives. This pressure pushed governments to implement stricter emission regulations, incentivizing automakers to develop and offer electric vehicles (EVs).

Technological Advancements: Significant advancements in battery technology led to increased range, reduced charging times, and lower battery costs. This addressed a major concern for consumers – "range anxiety" – and made EVs a more viable option.

Electrification trend have fared differently in different powertrains. Amongst those, Battery electric vehicles (BEVs) have emerged as a major player, fuelled by advancements in battery technology that addressed range anxiety. Government incentives and rising gas prices have further accelerated their adoption. Share of BEVs increased from 1% in 2019 to 7% in 2023 which clearly indicates the shift in consumer preferences. Hybrid electric vehicles (HEVs) remain another popular choice, offering a compromise for range-anxious consumers who still desire some electric driving benefits. HEVs saw its share increasing from 2% in 2018 to 7% in 2023. Plug-in hybrids (PHEVs) have seen moderate growth, but their dependence on charging infrastructure limits their appeal compared to BEVs. Finally, fuel cell electric vehicles (FCEVs) remain a niche segment due to the lack of widespread hydrogen refuelling stations and the high cost of the technology. This evolving landscape signals transitioning of market towards electric vehicles, with BEVs leading the charge, HEVs offering a familiar option, and PHEVs and FCEVs struggling to gain significant traction in the current environment.

Europe

Review of Europe PV sales volumes



Source: Mordor Intelligence, CRISIL MI&A

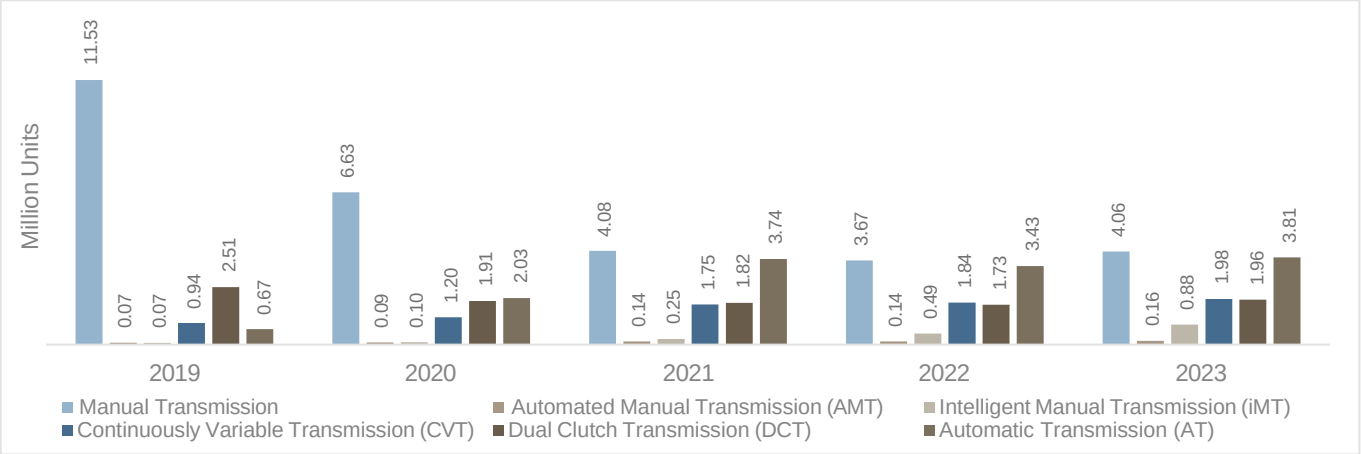
The European passenger car market has resembled a rollercoaster over the five years period between 2019-2023, experiencing a pre-pandemic boom, a pandemic-induced slump, and a hesitant recovery riddled with uncertainties.

2019 marked a golden year for European carmakers, with sales exceeding a remarkable 15 million units. Consumer confidence thrived on a robust economy. Favorable financing options further enticed buyers, leading to a surge in demand, particularly for SUVs and crossovers, which continued their dominance in the market. The arrival of COVID-19 in 2020 disrupted the entire European car market. Lockdowns implemented to curb the spread of the virus forced dealerships and production lines to shut down. Disruptions in global supply chains further exacerbated the situation. Consumer confidence plummeted due to economic uncertainty, leading to a sharp decline in car purchases. Sales figures nosedived to a low of around 11.7 million units in 2021.

The industry witnessed further marginal slump in 2022, with sales hovering around 11.3 million units. Recovery in volumes started from 2023 with sales volumes touching 12.85 million units backed by revival in demand and new launches in the industry. The recovery path was uneven across Europe. Major Western European markets like Germany and France experienced a slower rebound compared to their Eastern European counterparts with less established automotive industries. This disparity can be attributed to factors like varying levels of government support and pre-existing economic conditions. Overall, between 2019-23, industry witnessed a CAGR of (5)%

mostly due to a major slump in numbers during COVID-19 period, followed by gradual recovery with sales with sales still not reaching 2019 levels.

Review of Europe PV sales volumes by transmission type



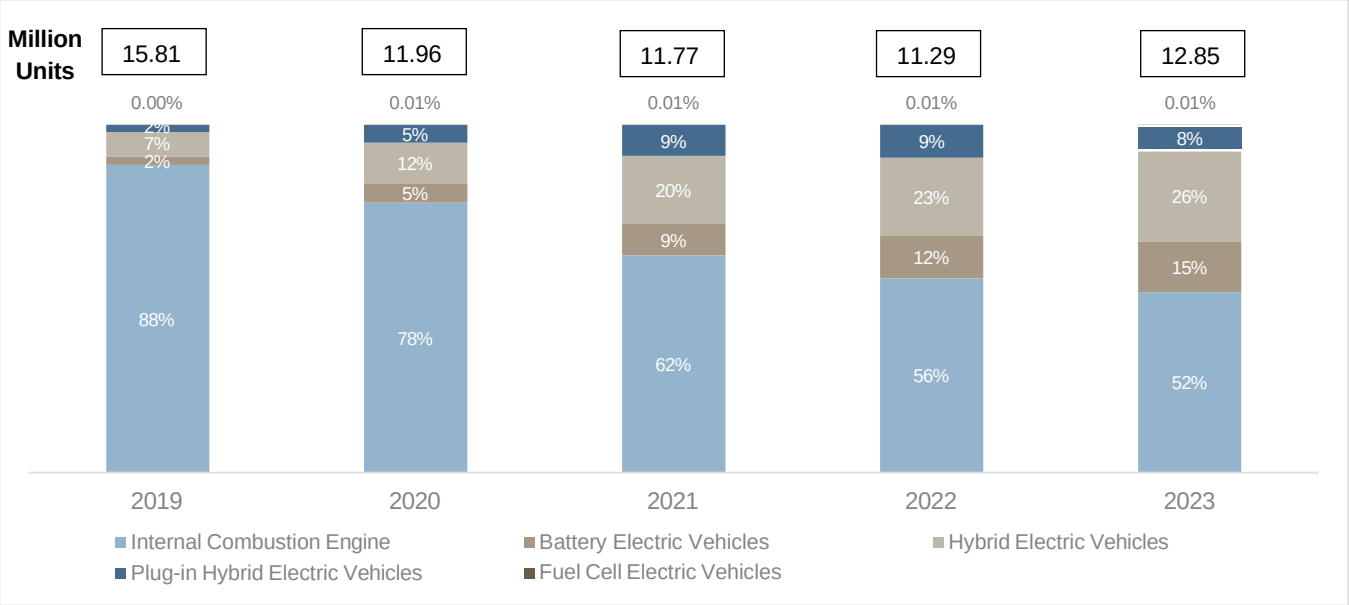
Source: Mordor Intelligence, CRISIL MI&A

The European passenger car industry experienced changes in transmission preferences from 2019 to 2023, reflecting the fluctuations in overall sales volume. In 2019, Manual Transmission (MTs) were popular due to their cost-effectiveness, engaging driving experience, and fuel efficiency. Automatic Transmission (ATs) with torque converters gained traction in larger vehicles like SUVs and crossovers, offering convenience and a smoother driving experience. Dual-Clutch Transmission (DCTs) were niche and found in performance-oriented and premium vehicles, appealing to drivers seeking sportiness and faster gear changes. CVTs had limited presence due to perceptions of a less engaging driving experience.

The pandemic disrupted production and sales, impacting all transmission types. Manual Transmission (MTs) declined gradually, while Automatic Transmission (ATs) continued to rise in popularity, especially in the SUV segment. DCTs remained niche due to higher cost and complexity. CVTs saw moderate growth in smaller, fuel-efficient cars but were limited by perceptions of a less engaging driving experience. Automatic Manual Transmission (AMTs) and Intelligent Manual Transmission (iMT) had limited presence in the European market.

The leading automakers in Europe are actively engaging to launch vehicles equipped with automatic transmission systems to gain a competitive edge in the industry while catering to the increased demand of consumers. In October 2023, Audi announced the launch of the special edition of the Tourist Trophy, equipped with an all-wheel drive system through a seven-speed, dual-clutch automatic transmission and a turbocharged 2.0-liter gasoline engine.

Review of Europe PV sales volume share by powertrain type



Source: Mordor Intelligence, CRISIL MI&A

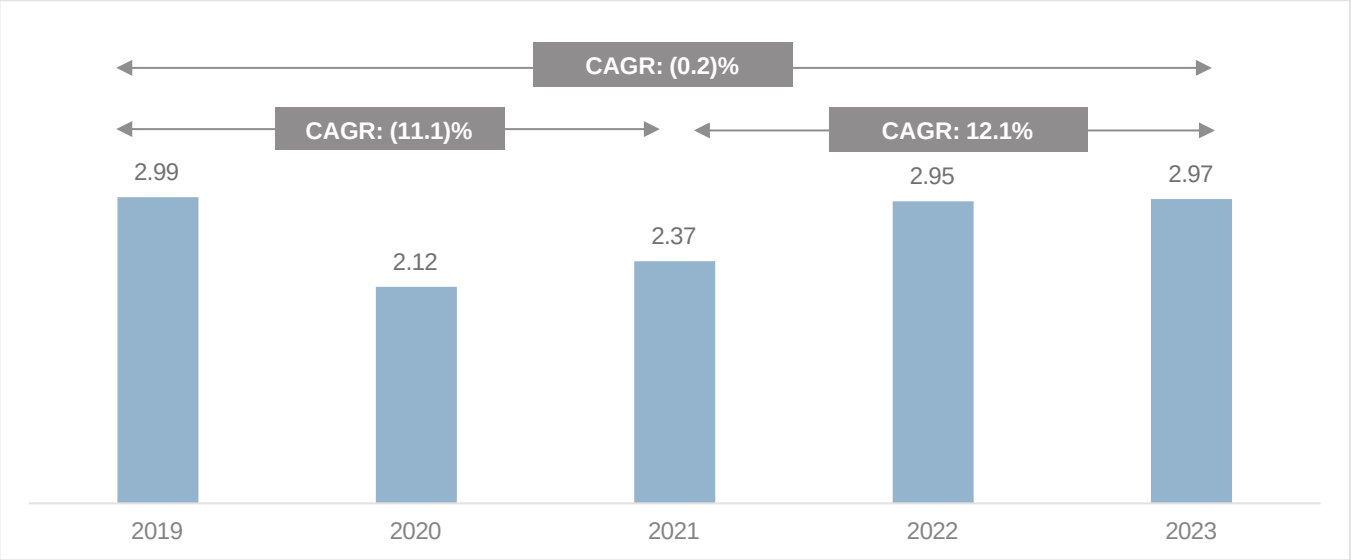
The European passenger car market underwent a significant shift in powertrain preferences from 2019 to 2023. Internal combustion engine vehicles dominated the market in 2019 due to well-established infrastructure and consumer familiarity. Battery electric vehicles were still in the early stages of adoption, facing concerns about range anxiety, limited charging infrastructure, and higher upfront costs.

However, the COVID-19 pandemic caused a decline in car sales for all powertrain types in 2020-2021. Interestingly, battery electric vehicles showed resilience during this period, benefiting from government incentives and increased focus on sustainability. Advancements in battery technology, expanding charging infrastructure, and government incentives contributed to the significant growth of Battery Electric Vehicles between 2021-23. Hybrid electric vehicles maintained a steady market share, appealing to consumers who were hesitant about fully committing to battery electric vehicles. Plug-in hybrid electric vehicles had modest growth due to their reliance on charging infrastructure and higher price point compared to hybrid electric vehicles. Fuel cell electric vehicles remained a niche player in the market due to the lack of hydrogen refuelling infrastructure and high cost.

Various international auto manufacturers are investing heavily in R&D activities to launch new car models in the European market, driven by growing customer needs. For example, Citroen plans to introduce an electric model with a base price of less than Euro 25,000 (USD 26,717) in the French and European markets by 2024.

ASEAN

Review of ASEAN PV sales volumes

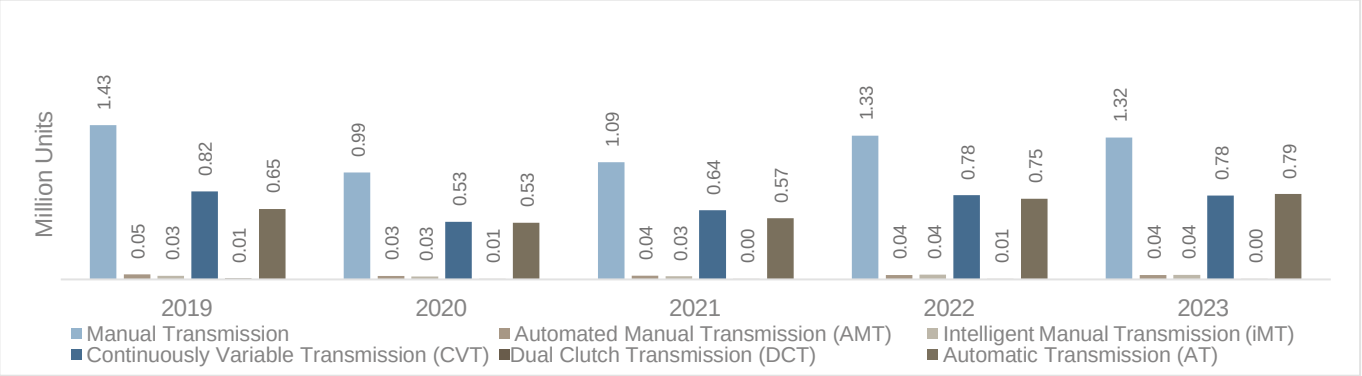


Source: Mordor Intelligence, CRISIL MI&A

The Association of Southeast Asian Nations (ASEAN) passenger car industry witnessed robust growth in 2019, which later took a hit due to pandemic. There was a de-growth of 11.1% between 2019-21.

The post-pandemic recovery for passenger cars was uneven. Sales figures might not have crossed pre-pandemic levels in 2023, however, there were signs of improvement compared to the pandemic years. Industry witnessed a CAGR of 12.1% between 2021-23. ASEAN car market was shifting gears. While SUVs and crossovers remain popular for practicality, a new wave was emerging. Growing environmental concerns and government incentives are driving the rise of electric vehicles (EVs) in the region. Chinese automakers are also making a splash with competitive prices and tech-focused models. To ensure sustainable growth, government policies promoting cleaner vehicles and investments in charging infrastructure are crucial.

Review of ASEAN PV sales volumes by transmission type



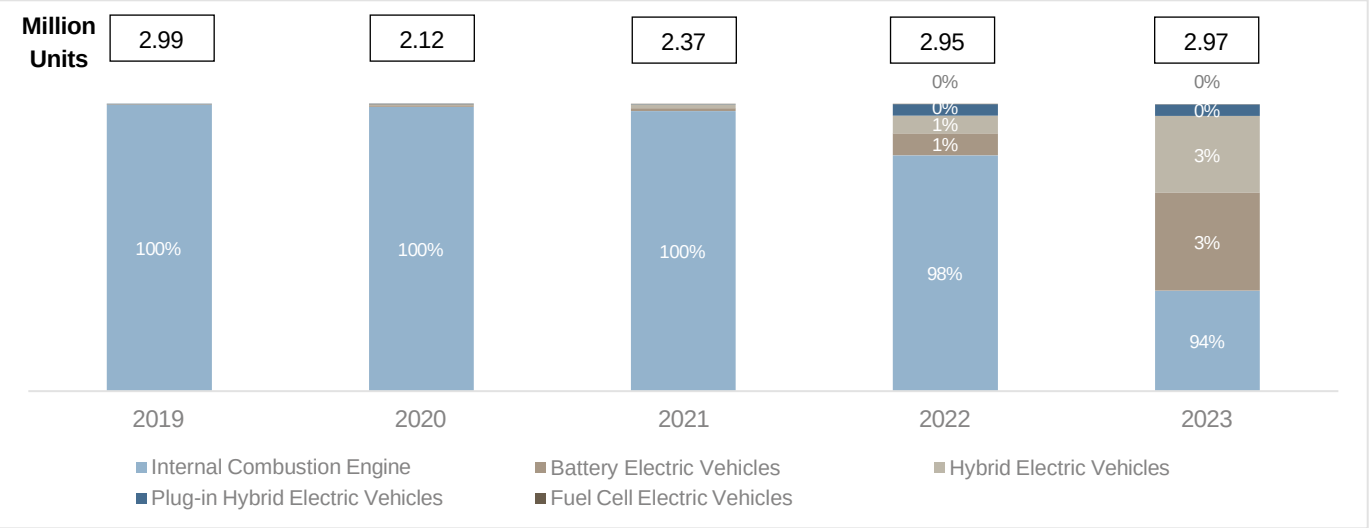
Source: Mordor Intelligence, CRISIL MI&A

The ASEAN car market experienced significant changes in transmission preferences between 2019 and 2023. In 2019, manual transmissions (MTs) were popular due to their affordability and fuel efficiency. However, automatic transmissions (ATs), especially those with torque converters, were gaining traction in higher-end car segments for

their smoother driving experience. Other transmission options like CVTs, AMTs, iMTs, and DCTs were in the early stages of adoption.

The COVID-19 pandemic in 2020 disrupted the car industry, leading to a decrease in overall sales across all transmission types. As the market cautiously recovered in 2022, the popularity of automatic transmissions (ATs), continued to rise. They saw an increase in share from 21.9% in 2019 to 27% in 2023. Factors such as consumer demand for comfort and convenience, dominance of sedans and hatchbacks, and additional features like automatic emergency braking contributed to the increased demand for automatic transmissions (ATs). Continuously Variable Transmission (CVT) maintained stability from the past three years and have maintained the share between 26-27% of the overall passenger cars market. Manual transmissions are expected to remain a niche choice for budget-conscious buyers and those seeking a connected driving experience, but their market share will likely continue to decline gradually.

Review of ASEAN PV sales volume share by powertrain type



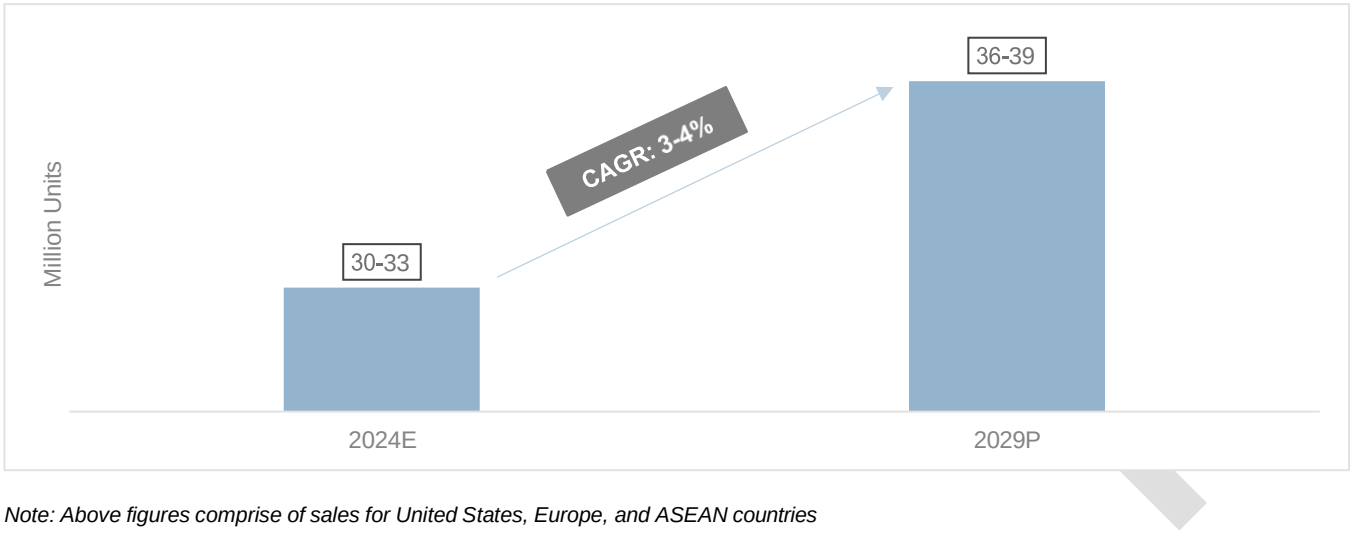
Source: Mordor Intelligence, CRISIL MI&A

The ASEAN passenger car industry has undergone a major transformation in powertrain technology, with a shift towards alternative fuel vehicles. In 2019, internal combustion engine (ICE) vehicles were dominant due to factors like infrastructure and affordability. However, there was a growing interest in alternative fuel technologies, with hybrid electric vehicles (HEVs) and battery electric vehicles (BEVs) gaining traction among environmentally conscious buyers. Higher upfront costs limited their adoption, while plug-in hybrid electric vehicles (PHEVs), and fuel cell electric vehicles (FCEVs) were scarce due to infrastructure limitations and high costs. The COVID-19 pandemic caused a decline in car sales, but as it eased in 2022-2023, a shift towards fuel-efficient alternatives like HEVs was observed. Internal Combustion Engines (ICE), that dominated the passenger cars market till 2021, started seeing some competition by other alternate fuel counterparts with Battery Electric Vehicles (BEVs) and Hybrid Electric Vehicles (HEVs) taking the lead amongst others. Both had approximately 3% share each in the overall market which is anticipated to see a further uptick in the coming years as consumers preferences and automakers plans, aligning with signs of promoting clean transport in ASEAN region.

BEV adoption remained limited due to charging infrastructure and upfront costs, while PHEVs and FCEVs also faced challenges. Governments in ASEAN countries are promoting electric vehicle adoption through subsidies and infrastructure investment. For instance, the Indonesian government extended the deadline for qualifying for EV incentives, while Thailand approved a new phase of the EV Package to support the growth of the EV industry.

Outlook of the global PV industry (CY24 to CY29)

Outlook of overall global PV sales volume

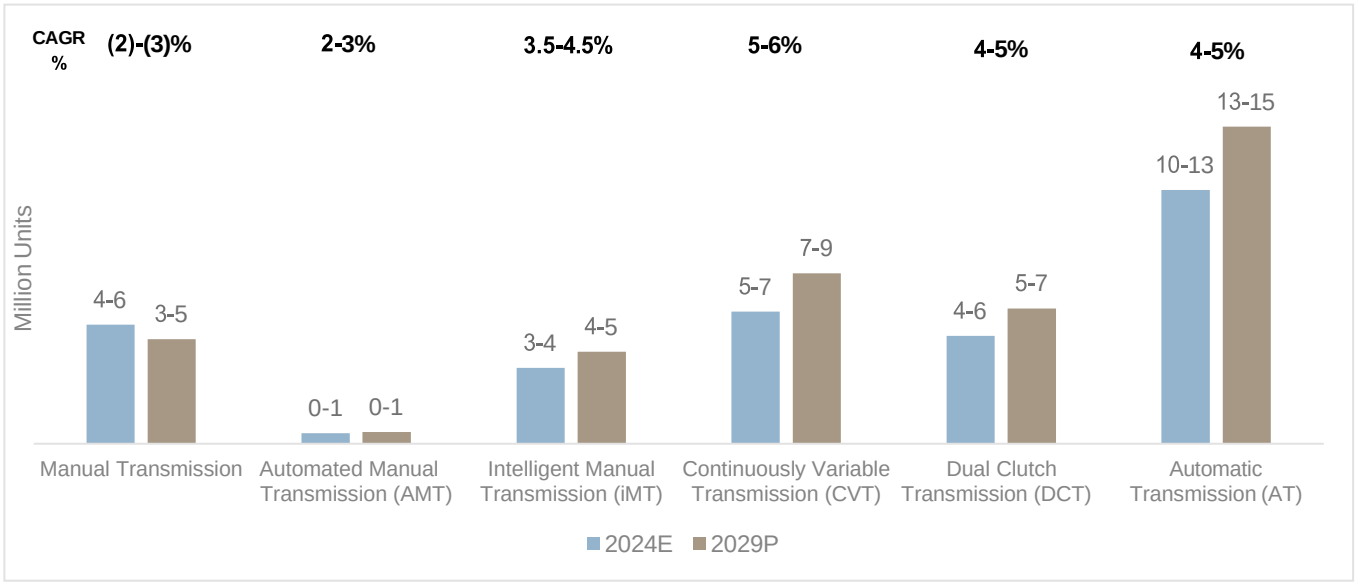


Note: Above figures comprise of sales for United States, Europe, and ASEAN countries
Source: Mordor Intelligence, CRISIL MI&A

The global passenger car market is expected to experience moderate growth from 2024 to 2029, likely at a slower pace than before the pandemic. This can be attributed to factors like global economic uncertainty and ongoing supply chain issues. Additionally, shifting consumer preferences towards electric vehicles and alternative ownership models could put a dent in traditional car sales. However, rising demand in emerging markets, advancements in EV technology, and government incentives promoting clean transportation could counter these trends. The future of the passenger car market hinges on a complex interplay of these forces.

On an overall level, global PV market is expected to witness a CAGR of 3-4% between 2024-29 with volumes reaching up to 36-39 million units in 2029.

Outlook of overall global PV sales volume by transmission type



Note: Above figures comprise of sales for United States, Europe, and ASEAN countries

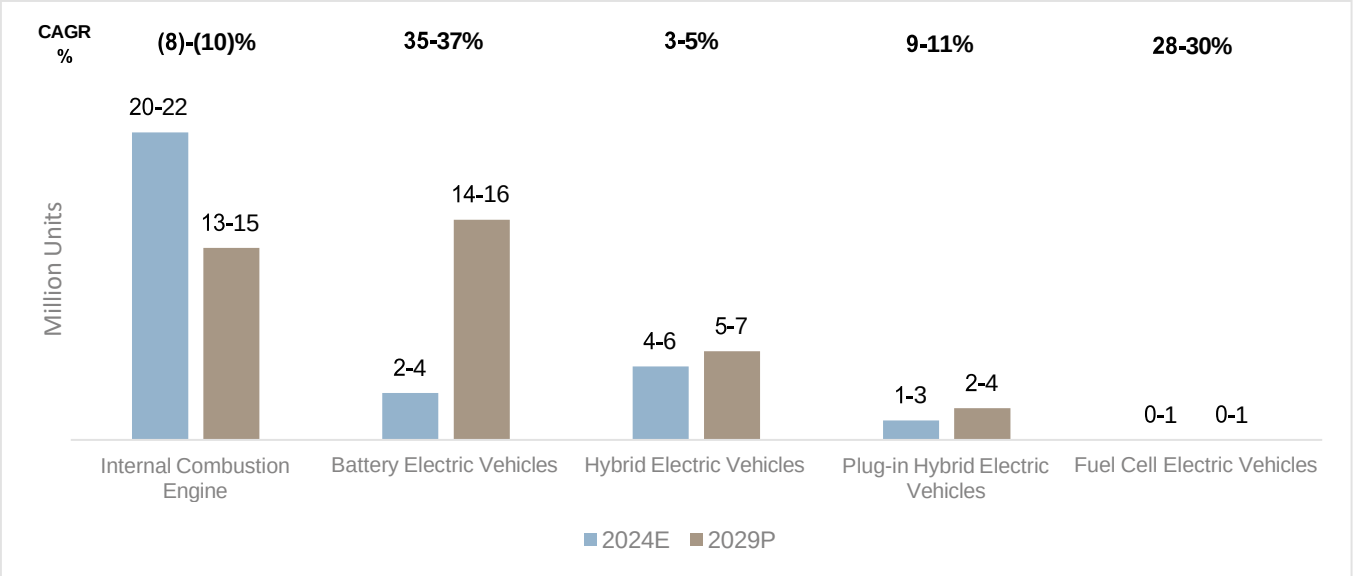
Source: Mordor Intelligence, CRISIL MI&A

The global passenger car market for transmissions is poised for a shift between 2024 and 2029. Automatic transmissions, particularly torque converters, will likely hold strong due to their comfort. ATs are expected to witness a CAGR of 4-5% between 2024-29 and reach 13-15 million units by 2029.

However, manual transmissions are expected to decline by (2)-(3)% between 2024-29, as consumers prioritize comfort and advancements make automatics more fuel-efficient. Continuously variable transmissions (CVTs) might

rise in popularity for their smooth and potentially fuel-efficient driving experience, while dual-clutch transmissions (DCTs) might see a niche increase in performance cars. The biggest change will likely be the rise of electric vehicles, which lower the need for traditional transmissions altogether.

Outlook of overall global PV sales volume by powertrain type



Note: Above figures comprise of sales for United States, Europe, and ASEAN countries
Source: Mordor Intelligence, CRISIL MI&A

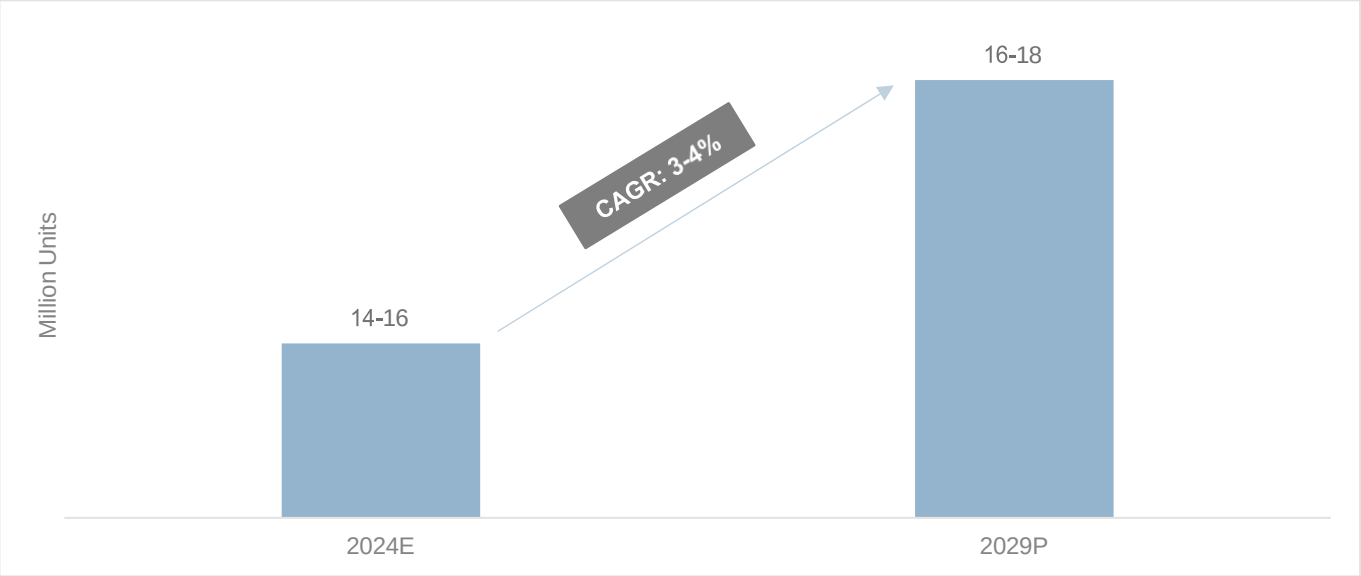
The global passenger car market for powertrains is poised for a dramatic shift between 2024 and 2029. Internal combustion engine (ICE) vehicles, though likely remaining a significant player initially, will face increasing pressure from cleaner alternatives, particularly battery electric vehicles (BEVs). BEVs are expected to grow at a CAGR of 35-27% to reach approximately 14-16 million units by 2029. Rising fuel costs, stricter emission regulations, and advancements in battery technology will incentivize consumers to move towards BEVs. Government support for BEVs and investments in charging infrastructure will further accelerate this transition.

Hybrid electric vehicles (HEVs) are expected to maintain a steady presence, offering a middle ground for those hesitant to fully commit to BEVs due to charging limitations thus clocking a CAGR of 3-5% between 2024-29. However, plug-in hybrids (PHEVs) and fuel cell electric vehicles (FCEVs) are likely to remain niche players due to charging infrastructure limitations (PHEVs) and the high cost and limited refuelling stations (FCEVs). The future of car powertrains will be a fascinating interplay of adaptation and innovation, with BEVs leading the charge towards a cleaner and more sustainable transportation landscape.

Outlook of Global PV industry by geography type

United States

Outlook of United States overall PV sales volume

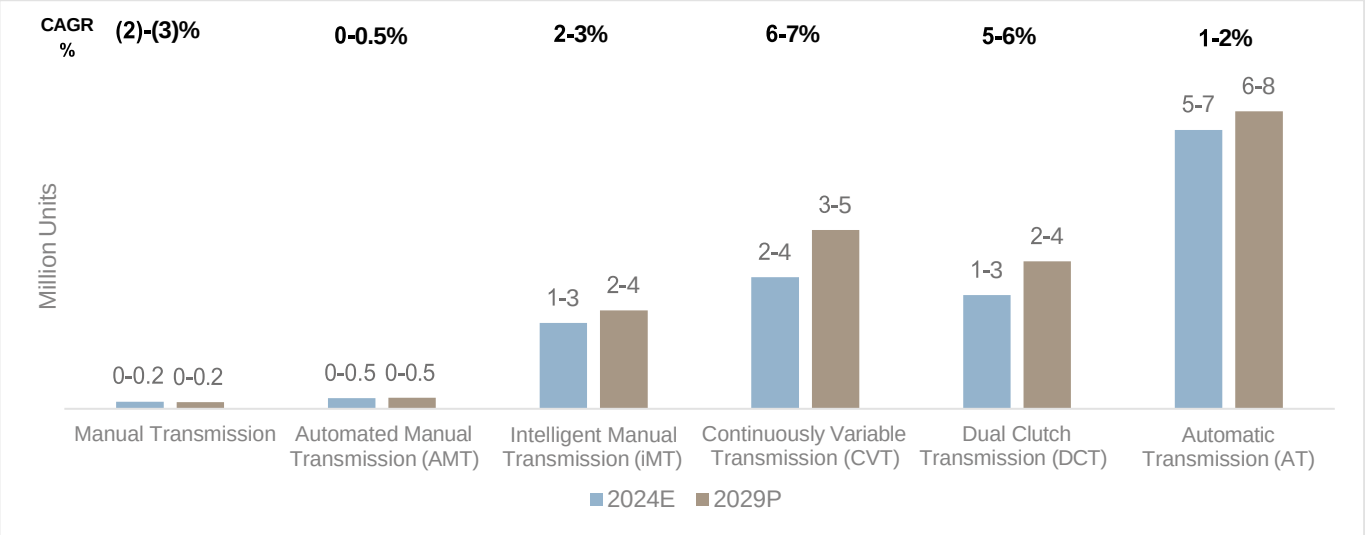


Source: Mordor Intelligence, CRISIL MI&A

The future of the U.S. passenger car market promises to be a fascinating dance between tradition and innovation from 2024 to 2029. Internal combustion engine (ICE) vehicles will likely hold strong in the near term, but a growing chorus of concerns will challenge their dominance. Rising fuel costs and anxieties about climate change could push consumers towards cleaner alternatives, particularly electric vehicles (EVs). Government incentives and investments in charging infrastructure could significantly accelerate this shift towards a more sustainable transportation landscape. Advancements in battery technology, offering greater range and faster charging times, will likely further entice consumers to embrace EVs. However, the overall pace of change will depend on consumer sentiment. While some may eagerly adopt EVs, others might be hesitant due to factors like range anxiety or upfront costs. Hybrid electric vehicles (HEVs) could carve out a comfortable niche, providing a bridge for those cautious about fully committing to EVs. This interplay of economic considerations, environmental concerns, technological advancements, and consumer behaviour will shape the U.S. car market's trajectory. The future is likely to see a cautious but steady rise of EVs alongside the continued presence of traditional options, paving the way for a more diversified and sustainable transportation landscape in the coming years.

United States PV market is expected to witness a CAGR of 3-4% between 2024-29 with volumes reaching up to 16-18 million units in 2029 from that of approximately 14-16 million units in 2024.

Outlook of United States PV sales volume by transmission type

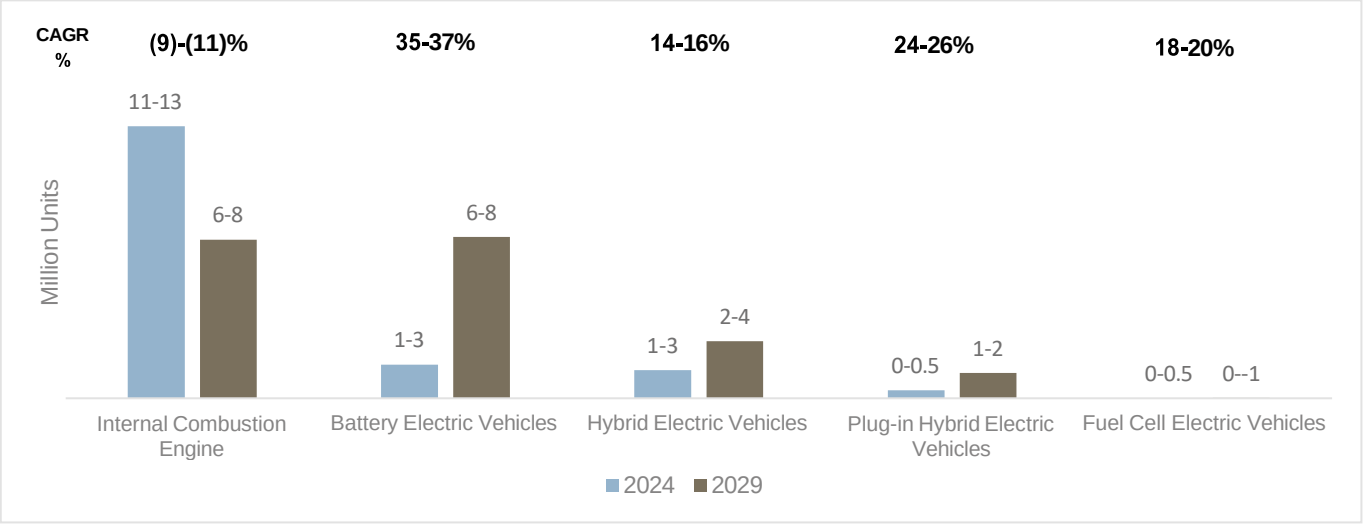


Source: Mordor Intelligence, CRISIL MI&A

The U.S. car market for transmissions is poised for a period of cautious change from 2024 to 2029. Automatic transmissions (ATs), particularly torque converters, will likely remain the dominant choice due to their established presence, comfort, and growing fuel efficiency. ATs are expected to witness a CAGR of 1-2% between 2024-29 with volumes reaching up to 6-8 million units in 2029.

Continuously variable transmissions (CVTs) might see a modest increase in popularity, particularly in smaller and more fuel-conscious car segments. Their smooth, uninterrupted power delivery and potential for improved fuel economy could appeal to a specific set of buyers. CVTs may witness a growth of 6-7% between 2024-29. On the other hand, DCTs may witness a growth of 5-6% between 2024-29. The future of U.S. car transmissions will depend on a complex interplay of factors like consumer preferences for comfort and fuel efficiency, advancements in both traditional and EV drivetrain technologies, and ultimately, the pace of EV adoption.

Outlook of United States PV sales volume by powetrain type



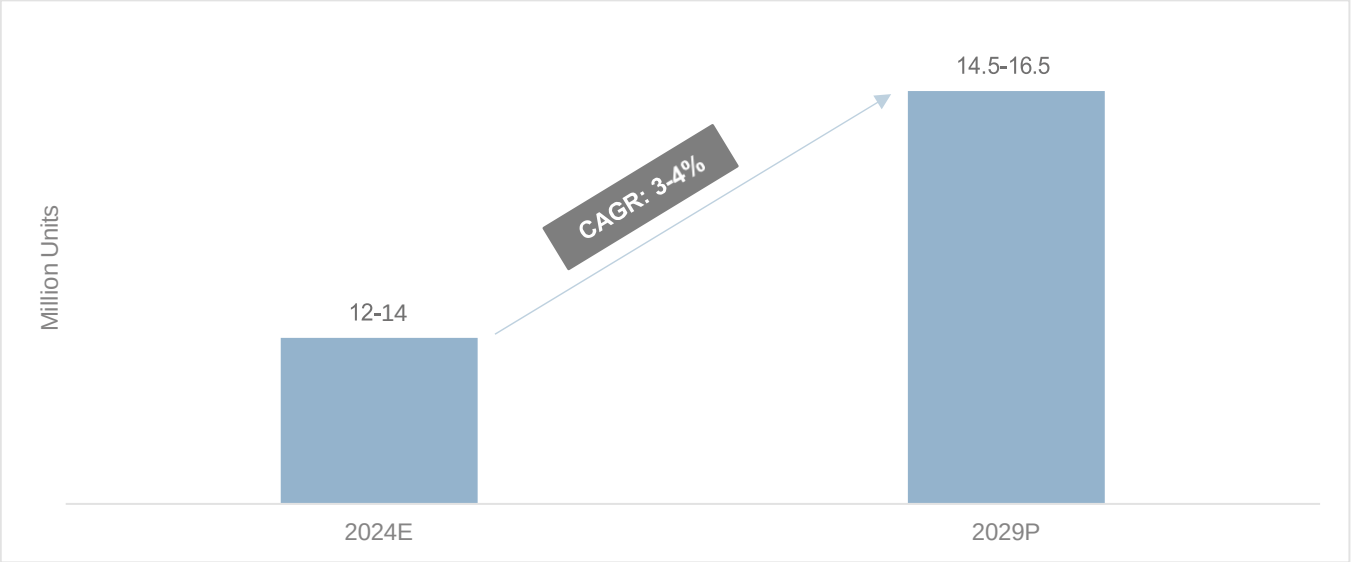
Source: Mordor Intelligence, CRISIL MI&A

The U.S. passenger car market for powertrains is predicted to undergo a gradual green shift, with battery electric vehicles (BEVs) at the forefront, between 2024 and 2029. While internal combustion engine (ICE) vehicles might hold strong initially, their dominance is likely to be challenged by a surge in popularity of BEVs. ICE vehicles shall witness a decline in volumes, with a de-growth of (9)-(11)% between 2024-29. Stringent environmental regulations, coupled with advancements in battery technology and potential government incentives, are expected to significantly accelerate the adoption of BEVs. This shift towards a more sustainable future will likely see BEVs become a mainstream choice for many American car buyers, particularly as charging infrastructure expands. BEVs are expected to witness a significant jump in volumes numbers i.e., up to 6-8 million units in 2029 with a CAGR of 35-37% during the same period.

Hybrid electric vehicles (HEVs) could find a steady niche, offering a comfortable compromise for those hesitant to fully embrace BEVs due to range limitations. HEVs may witness a steady rise in volumes with a CAGR of 14-16% between 2024-29. Plug-in hybrids (PHEVs) and fuel cell electric vehicles (FCEVs) are likely to remain niche players due to limitations in charging infrastructure for PHEVs and the high cost and limited refuelling stations for FCEVs. The U.S. car market is poised for a measured transition, with BEVs leading the charge towards a cleaner and more environmentally friendly transportation landscape in the coming years.

Europe

Outlook of Europe overall PV sales volume

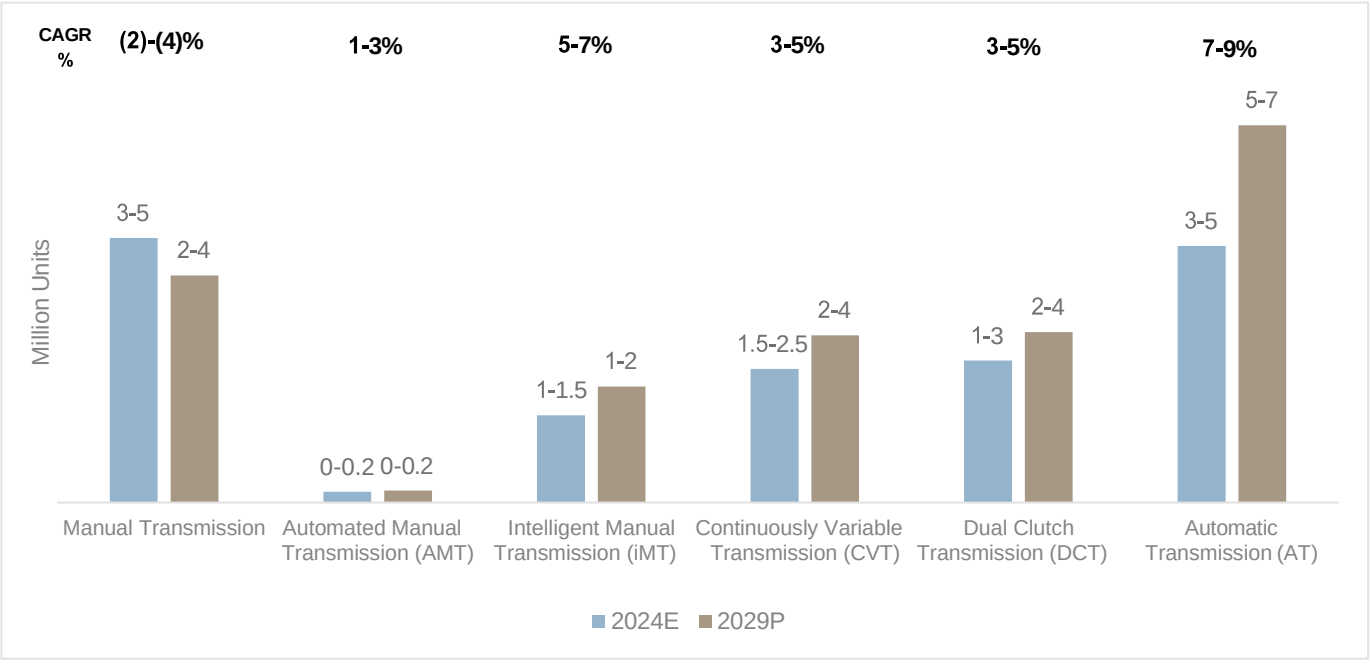


Source: Mordor Intelligence, CRISIL MI&A

The European passenger car market from 2024 to 2029 is expected to navigate a path towards electrification. Stringent emission regulations and growing consumer preference for eco-friendly options will likely drive a surge in electric vehicle (EV) sales. Government incentives and expanding charging infrastructure will further accelerate this shift. However, traditional internal combustion engine (ICE) vehicles might see a slower decline compared to global trends, due to a strong preference for gasoline and diesel options in some European regions. Overall, the market is poised for a transformation towards cleaner mobility solutions.

Europe PV market is expected to witness a CAGR of 3-4% between 2024-29 with volumes in 2029 reaching up to 14.5-16.5 million units from approximately 12-14 million units in 2024.

Outlook of Europe PV sales volume by transmission type

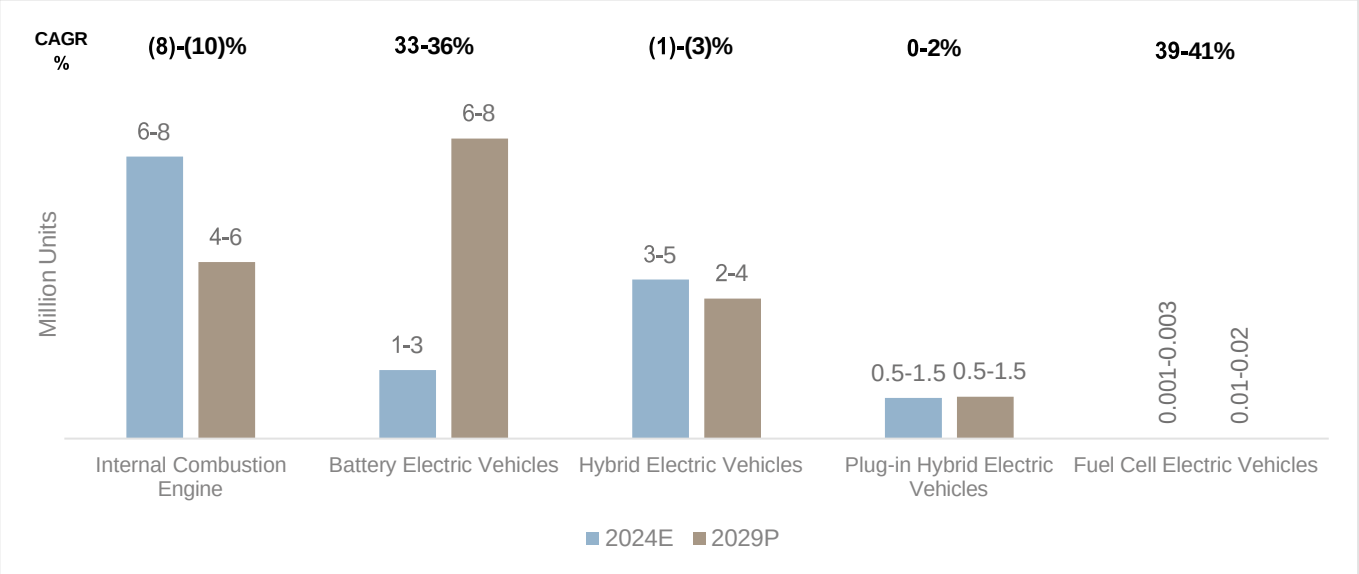


Source: Mordor Intelligence, CRISIL MI&A

The European passenger car market for transmissions is forecast to undergo a metamorphosis between 2024 and 2029. While automatic transmissions, lauded for their convenience and smooth driving experience, are likely to retain their dominant position, a paradigm shift towards electric vehicles (EVs) will undoubtedly reshape the landscape. Manual transmissions, once a mainstay for their affordability and driver engagement, may witness a gradual decline with a CAGR of (2)-(4)%. This can be attributed to a confluence of factors: the aforementioned comfort preference for automatics, coupled with advancements in automatic transmission technology that are rendering them increasingly fuel-efficient, diminishing a key advantage of manuals. ATs shall witness a CAGR of 7-9% between 2024-29 and may remain the dominant one in the coming years with more people opting for comfort and seamless driving experience.

Continuously variable transmissions (CVTs) might experience a modest increase in popularity, particularly in smaller and fuel-conscious segments, due to their ability to deliver a seamless driving experience and potentially enhance fuel efficiency. CVTs shall witness a CAGR of 3-5% between 2024-29 with volumes reaching up to 2-4 million units in 2029. However, the most significant disruption will likely emanate from the burgeoning adoption of electric vehicles. Unlike traditional gasoline-powered cars, EVs completely eliminate the need for conventional transmissions altogether, with electric motors directly propelling the wheels.

Outlook of Europe PV sales volume by powertrain type



Source: Mordor Intelligence, CRISIL MI&A

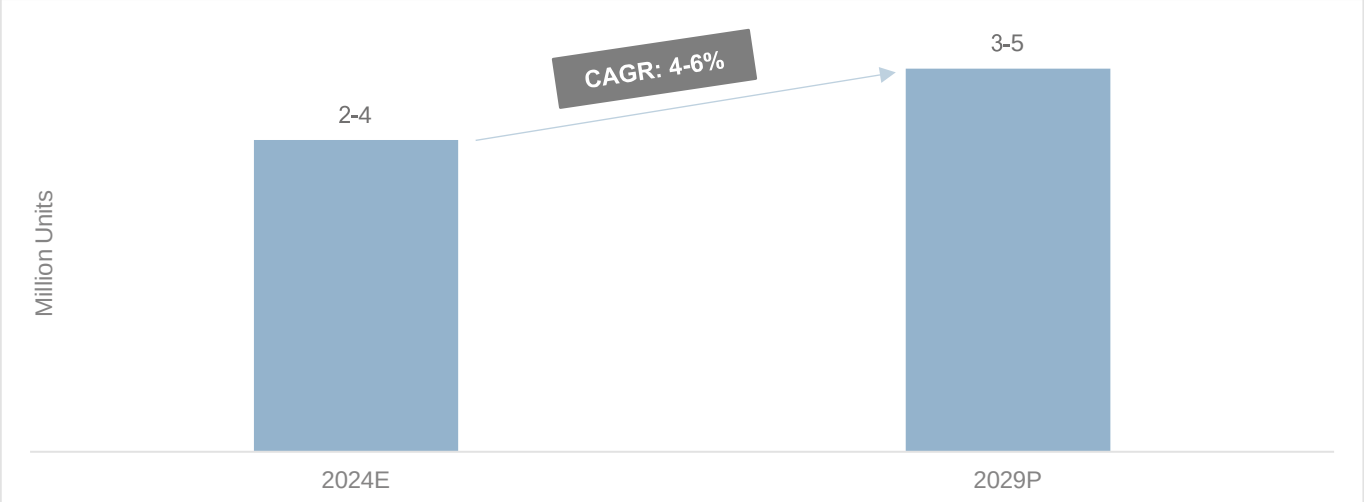
The European passenger car market for powertrains is poised for a green revolution between 2024 and 2029. While internal combustion engine (ICE) vehicles might hold some ground initially, their dominance is expected to be challenged by a surge in popularity of cleaner alternatives, particularly Battery Electric Vehicles (BEVs). ICE

vehicles may witness a downturn in sales with a declining CAGR of (8)-(10)% between 2024-29 whereas partial share of that declining sales number shall be filled into the BEVs category with volumes reaching up to 6-8 million units with a CAGR of 33-36% between 2024-29.

Stringent emission regulations, coupled with advancements in battery technology and government support for EVs, are expected to significantly accelerate the adoption of BEVs. This shift towards a more sustainable future will likely see BEVs become a mainstream choice for European car buyers. Hybrid electric vehicles (HEVs) might hold steady, offering a compromise for those hesitant to fully embrace BEVs due to charging limitations. HEVs shall witness a CAGR of (1)-(3)% between 2024-29. However, plug-in hybrids (PHEVs) and fuel cell electric vehicles (FCEVs) are likely to remain niche players due to limitations in charging infrastructure for PHEVs and the high cost and limited refuelling stations for FCEVs. The European car market is on the cusp of a thrilling transformation, with BEVs leading the charge towards a cleaner and more environmentally friendly transportation landscape.

ASEAN

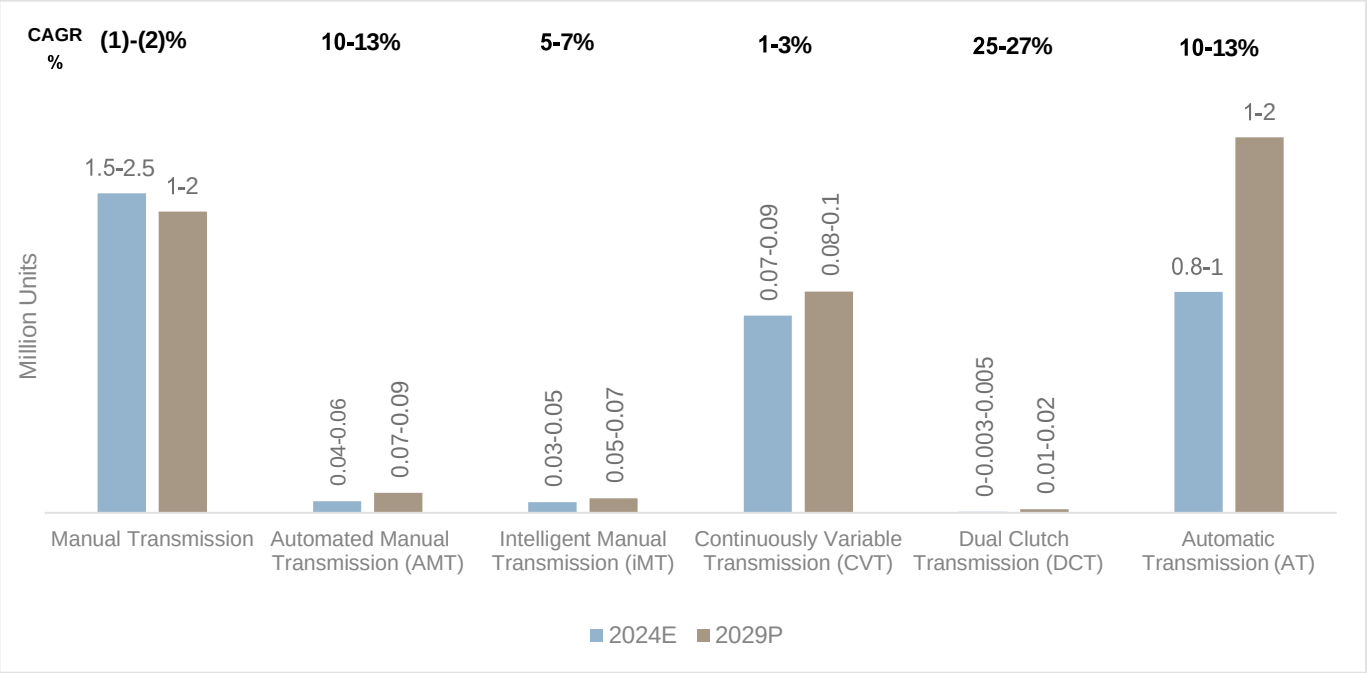
Outlook of ASEAN overall PV sales volume



Source: Mordor Intelligence, CRISIL MI&A

The ASEAN passenger car market is expected to navigate a course of moderate growth from 2024 to 2029 with a CAGR of 4-6% with volumes in 2029 expected to reach about 3-5 million units. Economic uncertainties and supply chain challenges might cast a shadow, but rising demand in emerging Southeast Asian nations could offer a counterbalance. The electrification wave will likely wash over the region, with a rise in electric vehicles (EVs) driven by government incentives and falling battery costs. However, internal combustion engine (ICE) vehicles will likely remain a mainstay in the near future, with hybrid electric vehicles (HEVs) potentially playing a bridging role.

Outlook of ASEAN PV sales volume by transmission type

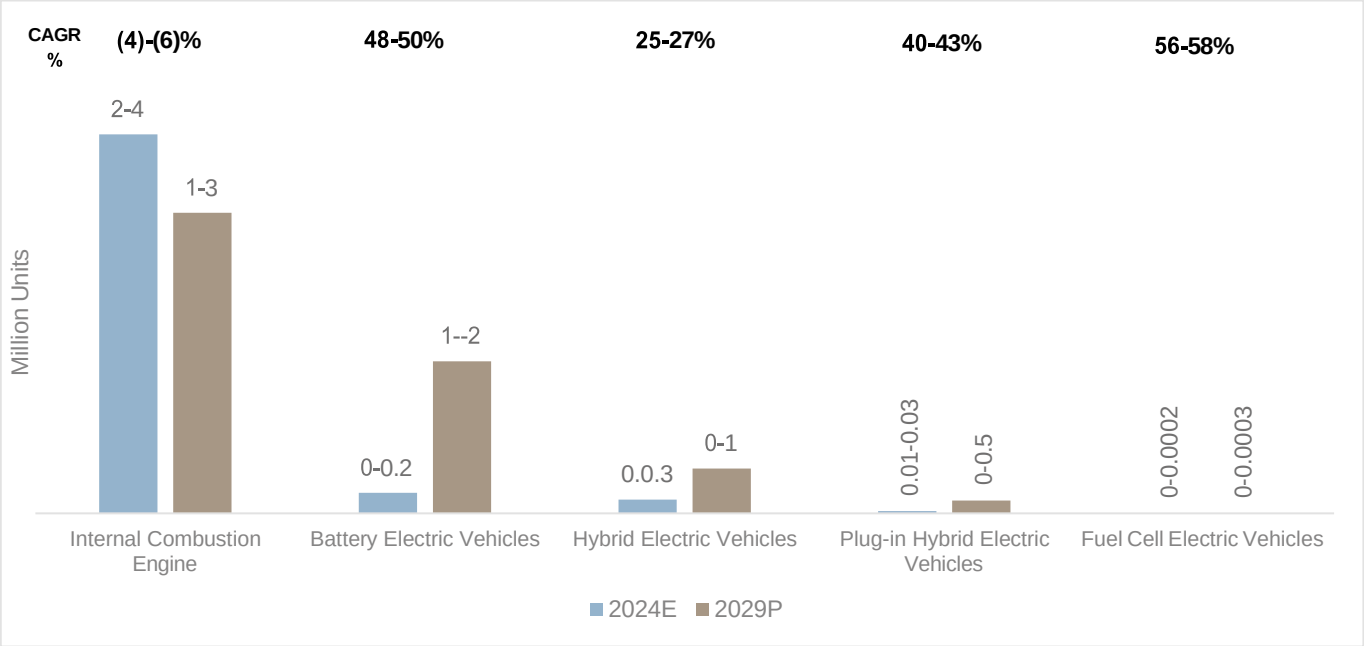


Source: Mordor Intelligence, CRISIL MI&A

The ASEAN car market's transmission landscape is expected to evolve between 2024 and 2029. While automatic transmissions (ATs) will likely remain dominant due to their comfort and convenience, advancements shall make them more fuel-efficient. ATs are expected to witness a CAGR of 10-13% between 2024-29.

Continuously variable transmissions (CVTs) could gain ground for their smooth driving experience, particularly in eco-conscious segments. Though the volumes may not see a significant jump and may witness a CAGR of 1-3% between 2024-29. Manual transmissions (MTs) might see a gradual decline with a CAGR of (1)-(2)%, as affordability becomes less of a deciding factor and automatics become more accessible. The rise of electric vehicles (EVs) will be a significant factor, as they eliminate the need for traditional transmissions altogether. This interplay between traditional options and the EV revolution will shape a more diversified transmission landscape in the ASEAN market in the coming years.

Outlook of ASEAN PV sales volume by powertrain type



Source: Mordor Intelligence, CRISIL MI&A

The ASEAN car market is expected to see a powertrain transformation from 2024 to 2029. While internal combustion engines (ICE) will remain prevalent, their dominance will likely weaken. Between 2024-29, they are expected to witness a CAGR of (4)-(6)% with volumes in 2029 declining up to 1-3 million units from 2-4 million units in 2024 Rising fuel costs and government incentives will propel electric vehicles (EVs), particularly BEVs, forward. BEVs may witness a CAGR of 48-50%, though volumes may remain lower than that of ICE, still a healthy CAGR indicates a potential transmission shift as far as demand is concerned.

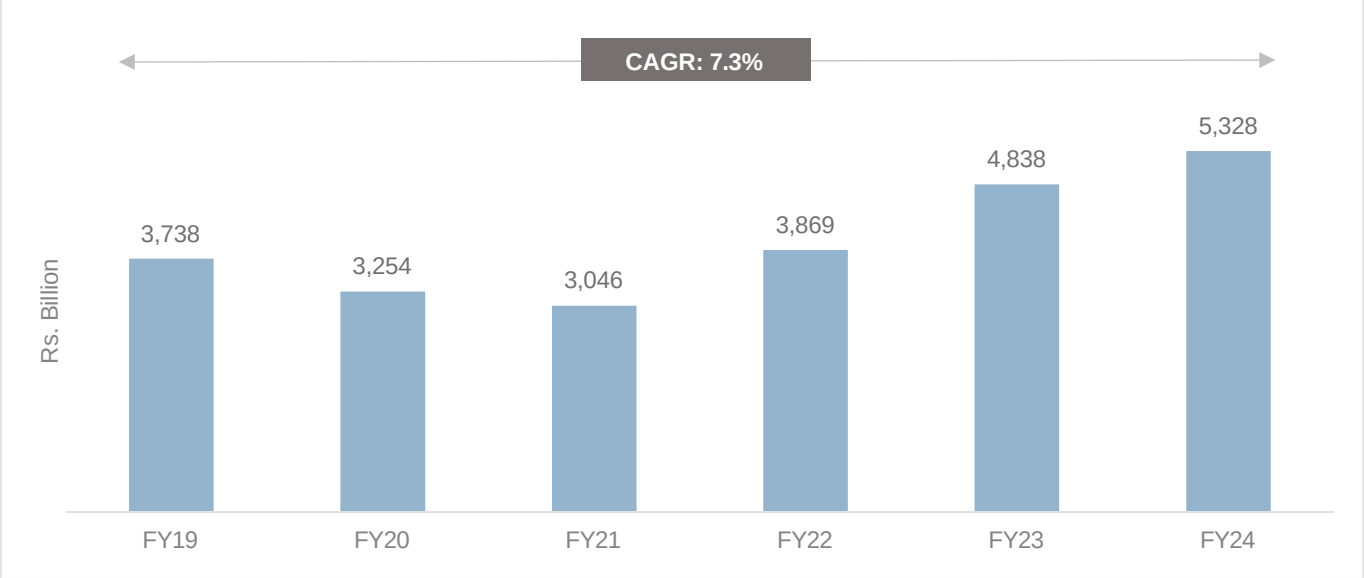
Hybrids (HEVs) might hold steady, catering to those cautious about full EV adoption. PHEVs and FCEVs are likely to see limited growth due to infrastructure challenges and high costs. This shift towards cleaner options will shape a more sustainable ASEAN car market in the coming years.

6. Review and outlook of the Indian Auto Component Industry

Historic growth and review of current market size (FY19-FY24)

Auto component production (which includes sales to OEMs, exports, and the replacement market) has increased at a CAGR of ~7.3% to Rs 5,328 billion in fiscal 2024 from Rs 3,738 billion in fiscal 2019. While domestic sales are more volatile due to various factors like regulations, fuel prices, economic cycles, etc. that impact the short-term demand, exports and aftermarket help buffer the overall auto-component production growth from similar fluctuations.

Figure: Domestic production of auto components (FY19-24)



Source: CRISIL MI&A

Auto component production revenue increased at 7.3% CAGR between fiscal 2019-2024 was aided by recovery in economy, buoyant demand from OEM and replacement market as well as increase in exports. CRISIL estimates domestic auto-component production revenue to increase by 8-10% in fiscal 2025.

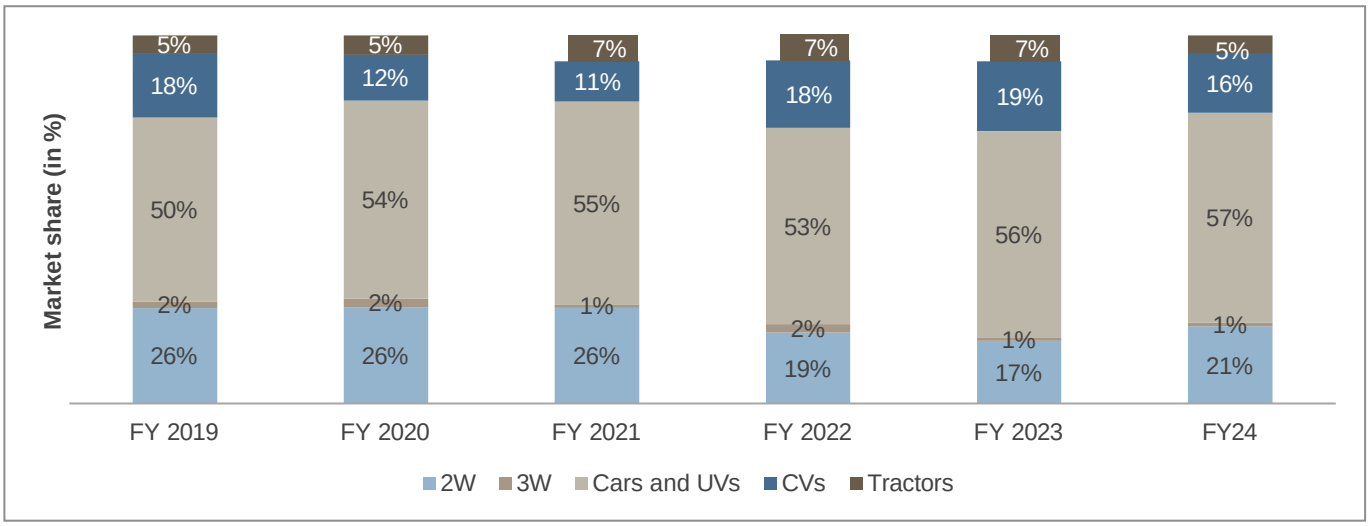
Production of automotive components depends on consumption by different end-user segments: original equipment manufacturers (OEM), exports and the replacement market. OEM demand can be further segregated based on various vehicle segments. In fiscal 2024, OEMs accounted for almost 63% of auto-component production by value. Among OEMs, cars and utility vehicle manufacturers remain the largest consumers.

Automotive component players are prone to risk due to the dependence on a few select clients or vehicle category and are highly dependent on demand from the OEMs.

The domestic auto components industry largely consists of small and medium enterprises. The industry is composed of 780+ organized players and 5,800 unorganized players. In terms of revenue, however, the organized

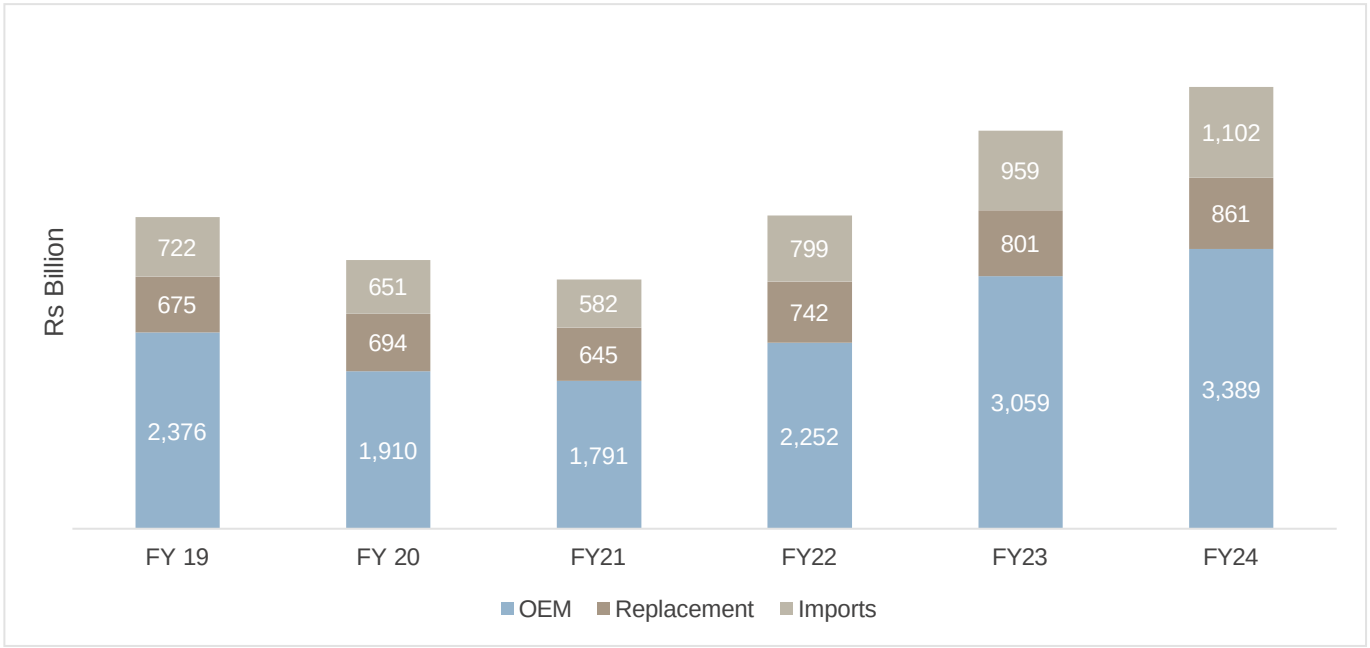
segment dominates the industry. Auto Component Manufacturers Association (ACMA) members represent 85% of the overall industry turnover. Over the past few years, more and more auto component companies have been registering as members of the ACMA.

Figure: Review of Auto component production segment by vehicle category

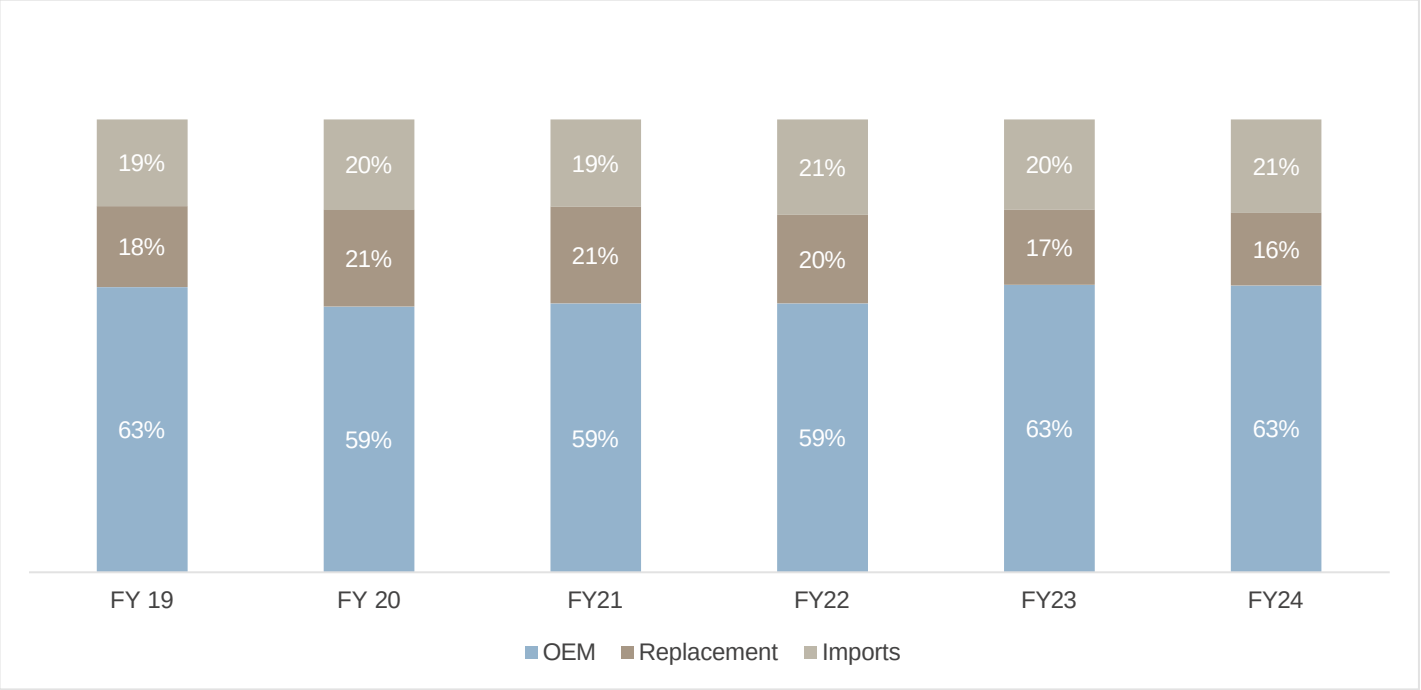


Source: SIAM, CRISIL MI&A

Figure: Trend in domestic consumption of automotive components (FY19-24)



Review of Auto component consumption segment



Source: CRISIL MI&A

In fiscal 2024, replacement segment is expected to clock 6-8% growth supported by the economic growth. In fiscal 2023, replacement demand growth was on the back of healthy OEM demand witnessed between fiscals 2017 and 2019. Assuming a two to three years of lifespan of automotive components, pent-up demand from fiscal 2020 and 2021 is likely to have translated into replacement opportunity in fiscals 2022 and 2023. Additionally, demand in the replacement market is expected to grow due to an increase in penetration of cab aggregator services in the overall stock of passenger vehicles in the medium term.

Auto component production revenue has surpassed the levels witnessed in FY19, wherein the industry reported a robust growth across all segments. Passenger vehicles, commercial vehicles and tractors are seen surpassing pre-Covid levels of production in fiscal 2023 while 2W, 3W will recover from slump in fiscals 2021 and 2022, albeit still below pre-Covid levels. Healthy demand from OEMs will drive auto-component demand followed by replacement and export markets.

Outbreak of second wave of COVID in the domestic market since April 2021 and the resultant state-wide lockdown impacted industry's revenues in Q1 of fiscal 2022. Post unlocks, some recovery was seen in the industry in H2 fiscal 2022. The growth in fiscal 2022 was aided by recovery in economy, buoyant demand from key export destinations like North America and Europe and increased demand from replacement market led by pent-up demand. CRISIL MI&A estimates that production revenue increased 27% in fiscal 2022.

In fiscal 2024, imports increased by ~15% on year growth. Fiscal 2022 saw big spike of 37% in imports on lower base of FY21. In fiscal 2021, imports declined by ~11% owing to subdued demand from OEMs and aftermarket amid the pandemic. Besides, the domestic auto component manufacturers also operated at below-normal utilization levels in the first half owing to subdued demand and nationwide lockdown.

Review of exports of auto components (FY19-24)

Auto component exports witnessed a strong growth at 10% CAGR during fiscal 2019-2024 period. Even during fiscal 2017-2020 period, exports witnessed a healthy growth at 11% CAGR. Fiscal 2021 witnessed a contraction amidst the pandemic and the restrictions.

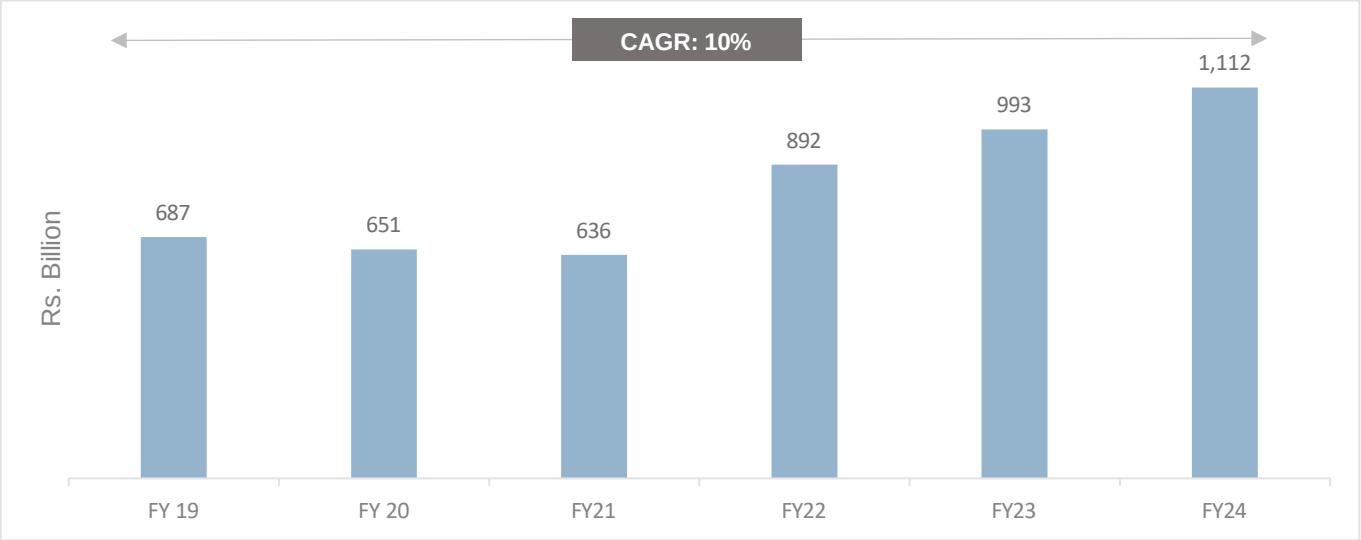
Auto component exports accounts for 21% of the overall demand in FY24 and is projected to record a 7-9% on year growth in fiscal 2025 post expected growth of 11-13% in fiscal 2024. The growth would be on the back of demand from North America and Europe which together contributed ~45-50% to the export demand during April-Jan fiscal 2024. Export revenues are also expected to be supported by increased global demand and China +1 strategy. However, rising inflation and global economic slowdown remains key monitorable.

More than 60% of India's auto component exports go to North America and Europe. This is largely due to market demand, quality improvements undertaken by players over the years, technological advancements, and favorable trade relations with countries like USA and Germany. Also, both of these regions have large automotive market with significant demand for auto components.

Exports witnessed growth in fiscal 2024 despite higher base of fiscal 2022. Demand from North America surged by 19% whereas Europe witnessed modest growth of 3% on-year during fiscal 2023 over a high base. From April to May 2024, demand form North America and Europe grew by 8% and 21% respectively.

India's top exports destinations are USA (27.8% of total exports), Germany (6.9%), Turkey (5.4%), Brazil (3.7%). Export demand has shown strong recovery post unlock. However, demand from Europe has been under pressure due to recessionary fears and global slowdown.

Figure: Review of exports of auto components (FY19-24)



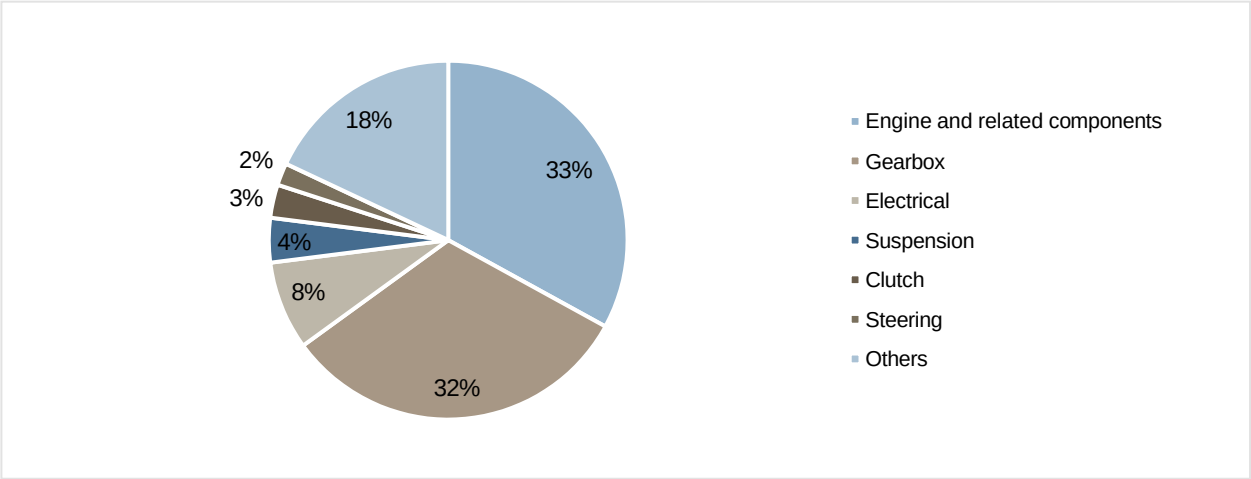
Source: CRISIL MI&A

Segment-wise major auto component categories in value terms

Major auto component from the revenue share is Engine component followed by suspension and breaking, drive transmission and steering etc.

Critical components, such as engine parts, drive transmission and steering, and electrical, are technologically more complex compared with lower-margin components, which were earlier the preserve of Indian players. They offer higher margins to manufacturers, but require greater investment in research and development, as well as high-precision engineering to adhere to the stringent quality standards of global OEMs.

Figure: Segment wise production break-up (FY24)



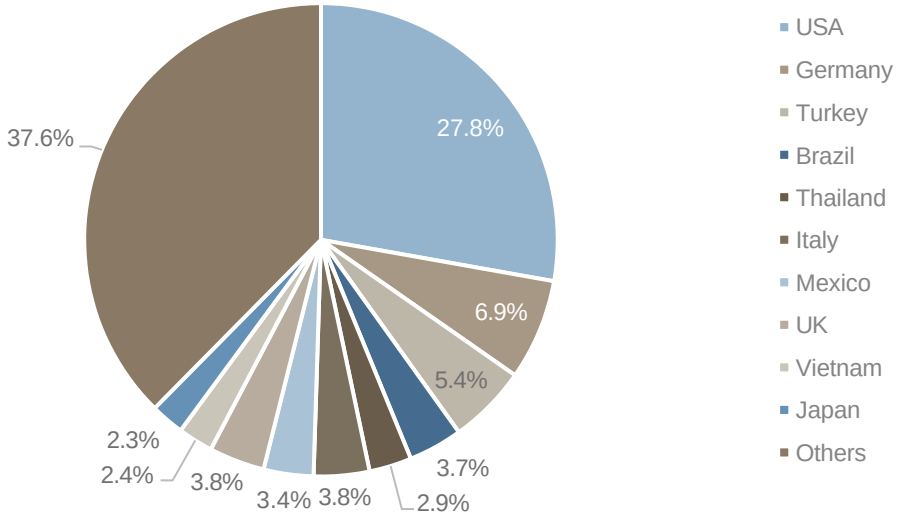
Source: Automotive Component Manufacturers Association (ACMA), CRISIL MI&A

India is moving towards the exports of more critical and high value components. For e.g: The share of share of critical components in our total exports have increased from 46% in FY18 to 61 % in FY24. The trend is expected to continue in coming years as well. This is a very big positive as Indian auto comp players have been able to

establish their credibility and able to increase ticket sizes and criticality of exports. This uptrading in exports along with the subsidies under the PLI scheme would help further provide a leg up to exports.

Second, the mix of countries of our exports with an established auto manufacturing base is also on an upswing with the USA, Germany and Italy gaining share at the expense of Brazil and Thailand.

Figure: Top exports destinations of auto components (FY24)



Source: DGFT, FTR Transport Intelligence, CRISIL MI&A

Growth drivers for Indian auto component industry

Demand side factors:

Vehicle production: Passenger vehicles, commercial vehicles and tractors are seen surpassing pre-Covid levels of production in fiscal 2023 while 2W, 3W will recover from slump in fiscals 2021 and 2022, albeit still below pre-Covid levels. Healthy demand from OEMs has been driving auto-component demand followed by replacement and export markets.

CRISIL MI&A expects almost all vehicle segments to log robust production growth over fiscals 2024-29. Production of 2Ws, 3Ws, PVs and CVs are projected to grow at a CAGR of 7-9%, 10-12%, 5-7% and 3-4%, respectively, over the forecast period.

Key macroeconomic trends are also likely to support demand for 2Ws, 3Ws, and PVs over the medium to long term. CRISIL MI&A expects urbanisation to reach 37-38% by fiscal 2027 from ~35% in 2020. India's per capita income is also projected to log a 6-7% CAGR over fiscals 2022-27. These factors are likely to drive premiumization across vehicle segments.

Rising Per capita income: In fiscal 2021, per capita income declined 8.9% owing to GDP contraction amid the pandemic's impact. On the lower base of fiscal 2021, per capita income rose 7.6% in fiscal 2022. However, per capita income is forecast to decline in line with GDP projection. According to the International Monetary Fund's estimates, India's per capita income (at current prices) is expected to increase at a 7.6% CAGR over calendar years 2023-28.

Investment in Infrastructure: Infrastructure improvements are expected to support automobile demand on account of employment generation, and improved accessibility and mobility.

Supply side Factors:

- India has a cost advantage in auto component production since it has cheap labour costs, is the world's second-largest producer of steel, and is close to important automotive markets. This makes it an ideal location for businesses to source vehicle components.
- India exports a significant amount of car components, which is likely to increase in the future years. India excels at manufacturing particular types of vehicle components, such as shafts, bearings, and fasteners, giving it a competitive advantage over other countries.
- The industry has been continuously upping its quality standards and developing new products to compete globally. Trade liberalisation in western markets has led to the emergence of Asia as an export hub for Europe, and North and South America over the past decade. With supply-chain realignment, several countries (including India) are likely to emerge as global outsourcing hubs in the coming years.
- Many domestic manufacturers have successfully entered strategic alliances/collaborations, while others are actively testing the waters. Many of the world’s leading Tier 1 suppliers have set up manufacturing facilities in India, including Bosch, Delphi, Visteon, and Denso. Additionally, some suppliers already meet global technical and quality standards at the Tier 1 level. Some of India’s leading OEM suppliers include TACO, Bharat Forge, Sundaram Clayton, and Sundaram Brake Linings.
- 2W automakers are introducing new models more frequently ever than before. This will also drive growth of the auto component industry as changes in the process of manufacturing and designing will support the pricing power of component manufacturers.

Policy support:

- PLI schemes on automobiles and auto components are estimated to generate a capex of Rs. 74,850 crore (US$ 9.58 billion) over the next five years. Under the automated route, 100% FDI is permitted in the auto components business. The Bharat New Car Assessment Programme (BNCAP) will not only enhance the auto component value chain, but it will also push the production of cutting-edge components, inspire innovation, and nurture global excellence.
- 115 companies applied for the Rs 25,938 crore Production Linked Incentive (PLI) scheme for the automotive and the auto component sector and 75 companies have been approved for the Component Champion Incentive scheme. Incentives are applicable for vehicles and auto components manufactured in India from 1st April 2022 onwards for a period of 5 consecutive years. The proposed incentives for original equipment manufacturers range from 13% to 18% of determined (incremental) sales value, while those for component manufacturers vary from 8% to 13%.
- As FAME Scheme concluded on March 31, 2024, The Government of India's Automotive Mission Plan (AMP) 2006-26 has been critical in assuring the sector's growth.
- EMPS 2024 (Electric Mobility Promotion Scheme) - introduced by Ministry of Heavy Industries with a total outlay of Rs. 500 crore for 4 months, w.e.f. 1st April 2024 till 31st July 2024, for faster adoption of electric two-wheeler (e-2W) and three-wheeler (e-3W) to provide further impetus to the green mobility and development of electric vehicle (EV) manufacturing eco-system.

Electrification:

The government has reaffirmed its support for EVs and its goal of achieving 30% electric transportation by 2030. Customs duty exemptions on the import of capital goods and machinery essential for the manufacture of lithium-ion batteries, which commonly power EVs, were announced in the budget.

EV adoption in India over the next five years is expected to be largely driven by the two and three-wheeler segments. Electric two-wheelers are seen to have lower cost of ownership and acquisition compared with ICE scooters which account for over 30% of the two-wheeler industry. This segment is expected to be the first one to migrate to the electric platform. Electric three-wheelers also have a lower cost of ownership and acquisition compared to their CNG and diesel counterparts.

Growing electronics content per vehicle:

The use of semiconductors in automobiles has increased manifolds in the past couple of years. Semi-conductors find their use in engine control units, power steering, airbags, reverse parking assist, smart keys, telematics, in-car entertainment, and other applications inside an automobile. Among vehicle segments, the intensity of use of semiconductors is higher for passenger vehicles (especially high-end models) and moderate for commercial vehicles while lesser for two-wheelers (except premium motorcycles) and tractors as there are fewer electronics used.

Critical component mix is increasing in the auto component exports basket:

Critical components, such as engine parts, drive transmission and steering, and electrical, are technologically more complex compared with lower-margin components, which were earlier the preserve of Indian players. They offer higher margins to manufacturers, but require greater investment in research and development, as well as high-precision engineering to adhere to the stringent quality standards of global OEMs. Typically, automotive OEMs are highly selective in qualifying suppliers with respect to critical products given the risks of switching suppliers, especially where product reliability is critical.

Indian manufacturers have been able to gradually increase their proportion of exports of critical components as they faced relatively less competition from other low cost producing countries in this segment. Many of these countries supplied more basic components, which were not as cost and quality intensive. India stepped up its share of exports of critical components significantly. This was possible since the domestic automotive market is increasingly attaining global technological intensity levels and component manufacturers continue to acquire greater technological prowess. Critical components are mainly exported to the US, Germany, Turkey, Italy, and Brazil. Also, off-late Indian safety and emission norms have been nearing global standards, and domestic companies have been gaining technology capabilities through joint ventures. Hence, critical component exports are projected to grow in the medium term.

Premiumization:

The buying factor for the consumer is moving away from fuel efficiency to external design and safety, and features have taken precedence over functionality. Consumers across all vehicle segments are increasingly demanding premium features and functionalities. Over the years, the key buyer and the influencer impacting the buying decision has also changed. Today, a car is seen as a reflection of the buyer's personality. Having a sunroof, desired color, a particular brand's music system, amongst others, have taken priority.

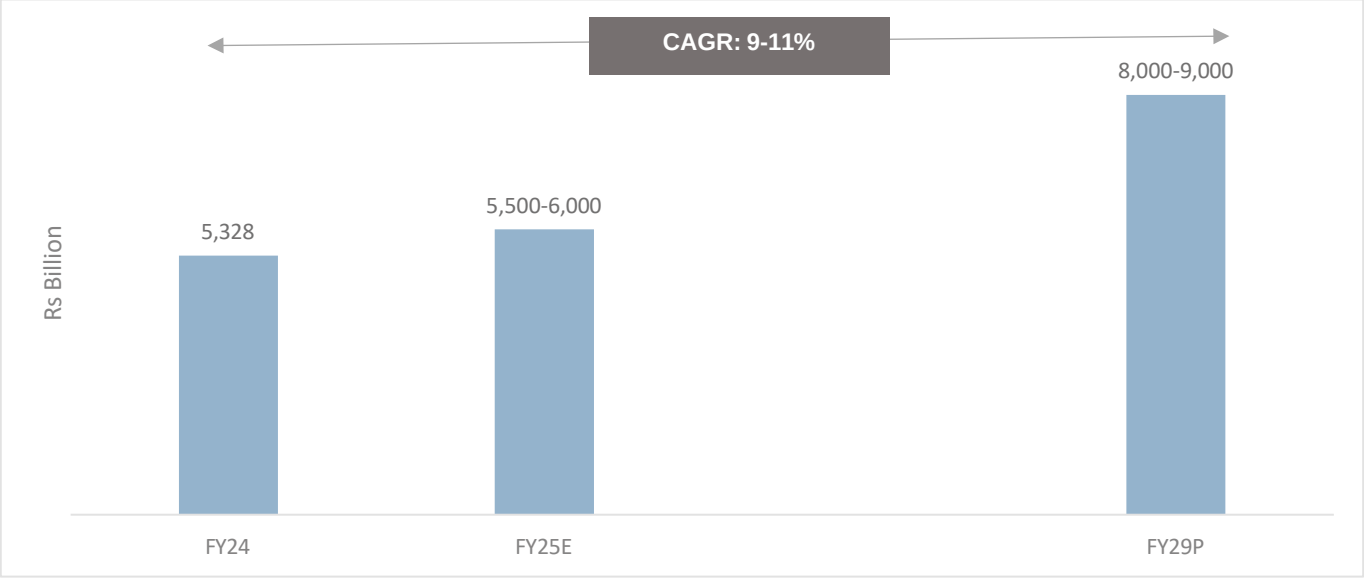
This trend is expected to continue, driving the demand for more sophisticated components which in turn will increase the usage of high margin product which would act as a huge boost for the auto component industry.

Outlook for automotive component industry (FY24-29P)

CRISIL MI&A expects auto component market size to grow at 9-11% CAGR between fiscals 2024 and 2029 to reach Rs. 8,500-9,000 billion. This is more than ~7% CAGR observed during fiscal 2019 to fiscal 2024. Long-term growth to appear higher over a low base wherein the auto component industry witnessed a significant decline in the preceding two fiscals (FY20 and FY21). Demand from all segments has grown further post fiscal 2023.

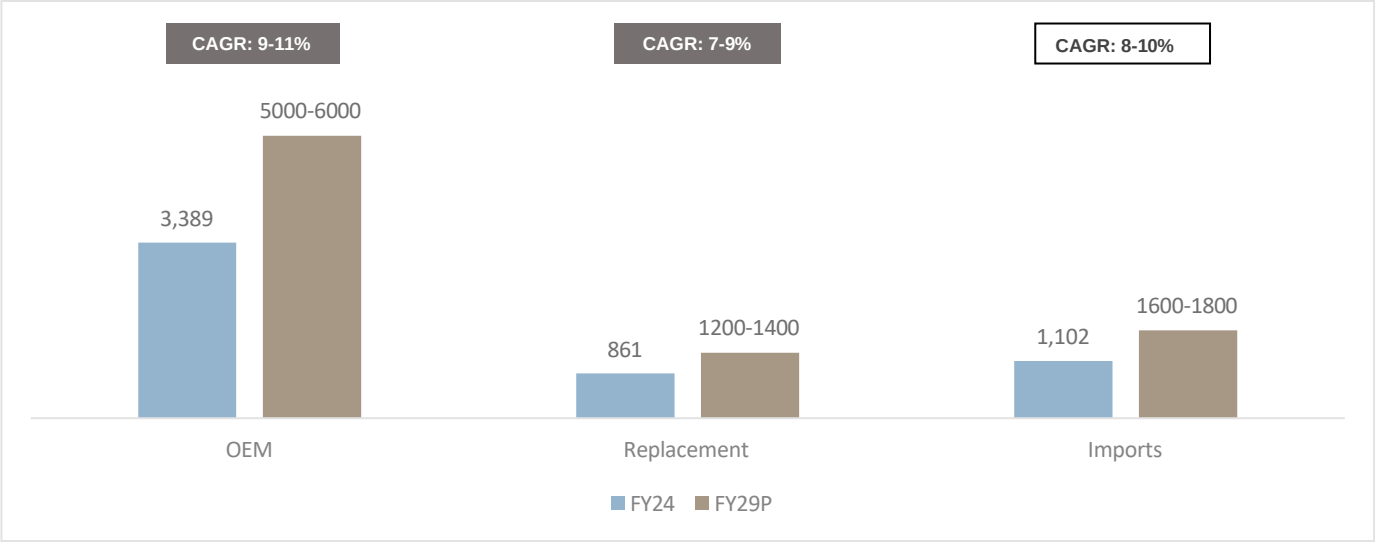
CRISIL MI&A projects auto component revenue is expected to increase by 8-10% in fiscal 2025. This can be attributed to increase in OEM demand, driven by the recovery in commercial vehicles (CV) and passenger vehicle demand. On the export front, Auto component exports (accounting for 21% of the overall demand in fiscal 2024) are projected to witness growth going ahead post higher double-digit growth post fiscal 2024.

Figure: Outlook on domestic production of auto components (FY24-29P)



E: Estimated, P: Projected
Source: CRISIL MI&A

Figure: Outlook on domestic consumption of auto components (FY24-FY29P)



E: Estimated, P: Projected

Source: CRISIL MI&A

The growth in FY25 will be aided by recovery in economy (GDP growth of ~6.8%), buoyant demand from OEM and replacement market.

OEM demand is expected to clock 9-11% CAGR between fiscals 2024 and 2029 on the back of robust production growth across asset classes in the medium term (on a low base) and aided by realisation growth via OEM price increases.

Commercial vehicle production is expected to grow by 3-5% CAGR between fiscal 2024 and 2029 on account of improvement in infrastructure expenditure and lower penetration in light commercial vehicles. Demand is expected to increase during the period with medium & heavy commercial vehicle leading the growth in the upcoming five years. The growth can be attributed to an improvement in industrial activity, rising replacement volume and government's thrust on rural transportation.

Passenger vehicle segment production is expected to grow by 6-8% in fiscal 2025. Production improved significantly in FY23 and FY24 due to easing supply conditions coupled with healthy demand for new models primarily UV's. Capacity utilization levels of PV manufacturers is likely to be higher in fiscal 2025 compared to ~68-72% the preceding year.

Two-wheeler production growth is expected to grow by ~11-13% in fiscal 2025. Two-wheeler production grew by 10% in April-Feb fiscal 2024 owing to strong festive season demand and increasing EV adoption. Domestic wholesale volume is expected to grow by 10-12% in fiscal 2025 after an expected growth of 11-13 % in fiscal 2024.

Tractor production is expected to increase by 4-6% aided by a predicted normal monsoon boosted by the impact of La Nina in fiscal 2025. The increase if post an expected decline of ~8-10% in fiscal 2024 due to lower domestic demand as poor distribution of monsoon, low reservoir levels, elevated inventory levels and impacted rural incomes have restricted demand. The proportion of manufacturing activity outsourced to auto component makers is highest

for cars and utility vehicles, explaining this segment's high contribution to OEM revenue. Outsourcing in the commercial vehicle segment is lower than for cars, but is expected to increase in the future, owing to growing technological spends by auto component players due to BS VI and safety norms. We expect localization by certain OEMs to increase, in turn supporting growth in domestic OEM offtake.

Healthy replacement demand along with an increase in realisations, to support replacement demand

The auto component replacement market is projected to increase by 7-9% CAGR between fiscal 2024 and 2029. This is due to increased OEM demand between fiscals 2017 and 2019 along with two to three years of replacement cycle. Moreover, auto component players undertook price hikes in recent months to offset the uptick in commodity prices. Hence, rising realization, to some extent, coupled with pent-up demand from fiscal 2021 wherein the vehicular movement was restricted is likely to aid the demand growth. Besides, demand in the replacement market is expected to grow due to an increase in penetration of cab aggregator services in the overall stock of passenger vehicles. Nonetheless, increased durability of components (better quality), better road infrastructure and increase in service intervals would restrict the robust growth.

'Make in India' push is likely to put brakes on import growth in the long term

Imports are expected to grow by 8-10% between fiscal 2024 and 2029. The government's high focus on electric vehicles (EVs) and imports of batteries and cells, battery management systems (BMS) is expected to drive growth in the long term, although to be restricted by low EV penetration in the near term. However, government initiatives of production linked incentive scheme to provide Rs 18,100 crore for advanced chemistry cell batteries is expected to increase localization of battery manufacturing. This will in turn reduce such imports going ahead.

Conclusion

The mobility industry is experiencing significant increase in complexity of the products due to the transformative shift across the globe due to the increasing electrification of vehicles, significantly impacting connective products and mechatronics products such as wiring harness, terminals, connectors and switches. This shift is reshaping the competitive landscape, with a distinct advantage for players who possess expertise in high technology. This complexity is expected to translate into a higher value per vehicle, further emphasizing commitment to deliver innovative solutions that align with the evolving demands of the automotive industry.

Companies with robust research and development capabilities, manufacturing and design, strong technological prowess, and a healthy financial profile are emerging as industry leaders. The mobility segment, last mile mobility segment, e-two wheelers and e-passenger vehicles are at the forefront of this global electrification trend, driving significant demand for design and development capabilities among solution providers. As the industry continues to evolve, companies that can leverage both design and development capabilities with a robust technological understanding will lead this technological evolution. Viney Corp is one of the few auto component companies, that has access to advanced technology and specializes in design and manufacturing which places them well to take advantage of the connective products and mechatronics products which are critical components in vehicles.

7. Profiling of key automotive component players competing with Viney Corp

Key player profiles

Key players in the component manufacturing for automotive are Viney Corp, Uno Minda Ltd, Motherson Sumi Wiring India, Minda Corporation Limited, Varroc Engineering Limited and others.

Viney Corp

Key facts	Brief profile
Year of incorporation: 1992 HQ: Gurgaon, Haryana	Viney Corp is one of the leading manufacturer, supplier and exporter of automotive components i.e., Connective products and Mechatronic products to leading OEMs & Tier-I (direct suppliers to OEM) system suppliers in India & overseas. Founded in 1992, the Company continues to pioneer breakthrough mechanical, mechatronic and electronic technologies for wiring harness, connectors and switches, supplied to leading two-wheeler, passenger vehicle and commercial vehicle manufacturers in India and overseas. The product portfolio of the Company in India comprises wiring harness, plastic parts/connectors, terminals, Teflon and auto-grade wires, automotive lamps, fuse box, relays, switches, cap noise suppressors and rubber components. In Europe, the Company focuses on mechatronic/mechanical switches, plastic parts and wiring harness. Company designs and manufactures a wide variety of connective products such as fuse boxes, wiring harnesses, wire, cables, terminals, and connectors (“Connective Products”). Company also manufactures diverse mechatronics products such as steering wheel switches, gear shifting paddles, light control units, Brake pedal switches and sensors, multimedia plugs and airbag on/off switches which can be categorised as visible switches or hidden switches (“Mechatronic Products”) 1 out of every 6 two-wheeler sold in the country are fitted with Viney Corp’s device wiring harness as of fiscal year ending 31st March 2024. The company specializes in designing, manufacturing, and distribution of Connective products and Mechatronic products which are critical components in vehicles. It’s in-house capability to design and manufacture tools sets them apart from their competitors and is a testament to their commitment to self-sufficiency and efficiency. **Technical tie-ups:** VCPL fully acquired Vimercati Italy in fiscal 2015. Vimercati is one of the market leaders in the design and manufacture of mechanical and mechatronic switches for the automotive market.

	In Europe, the company operates through two production sites—Italy and Romania. Viney Corp is amongst one of the few Indian switch manufacturers with in-house capabilities to design and manufacture switches catering to both high-end and mass-market vehicles as of March 31, 2024.
Plant locations - Four manufacturing facilities in India, two manufacturing facilities in Italy, one manufacturing facility and one internal production unit, both located in Romania. **Key clients -** Large automobile companies including, BMW, DAF, FIAT Group, Renault, Rolls Royce, PSA, Hero, JNS, Minda, FIEM, TVS, Bajaj, Denso, Federal Mogul, Maruti Suzuki, and many more are the companies' key customers.	

Source: Company reports, CRISIL MI&A Consulting

Uno Minda Ltd

Key facts	Brief profile
Year of incorporation: 1992 HQ: Gurgaon, Haryana	The company specializes in the manufacture of auto components for the global and domestic automotive market. It caters to two-wheelers, three-wheelers, PVs, Commercial vehicles (CVs), and offroad vehicles. The major business segment includes Switches, Lighting, Casting, Seating, Acoustics and others. It manufactures diverse parts and accessories for motor vehicles such as brakes, gearboxes, axles, road wheels, suspension shock absorbers, radiators, silencers, exhaust pipes, catalyzers, clutches, steering wheels, steering columns, and steering boxes. **Technical tie-ups:**

	Uno Minda has 18 direct subsidiaries, 12 step down subsidiaries, 7 joint ventures and 6 associates as of FY23. Besides this, it also has control over 5 partnership firms.

Manufacturing Capacity -

Casting Business: Aggregate four-wheeler alloy wheel capacity at Gujarat and Bawal now stands at 3.2 lakh wheels per month of GDC technology and 25,000 wheels of LPDC technology.

Two-wheeler alloy wheel: Currently they have a manufacturing capacity of ~3.6 million wheels and further they have plans to increase this to ~5.6 million wheels owing to an increase in demand.

Plant locations -

Uno Minda has manufacturing facilities in India, Indonesia, Vietnam, Spain, Germany, Mexico and Colombia. Its R&D and engineering centers are in India, Taiwan, Germany and Spain. It has more than 70 manufacturing plants globally and sales offices in North America, Europe, and the Association of Southeast Asian Nations (ASEAN) member countries.

Key clients -

Toyota Kirloskar Motor, Hero MotoCorp, Piaggio Vehicles, TVS and Bajaj

Source: Company reports, CRISIL MI&A Consulting

Minda Corporation Limited (Spark Minda)

Key facts	Brief profile
Year of incorporation: 1985 HQ: Noida, India	Minda Corporation – the flagship company of Spark Minda Corp) is a prominent manufacturer of automotive components for OEMs and Tier-I suppliers. Manufactures and assembles safety and security systems, and their associated components for the automotive industry in India, the rest of Asia, the Americas, and Europe. They supply their products to Indian OEMs and export about 20% of their products to USA, UK, Europe & South East Asia and ASEAN countries Minda Corporation offers a diverse range of products including Mechatronics, Information and Connected Systems, plastics and Interiors, Aftermarket, Electronics Manufacturing Excellence, and Spark Minda Green Mobility. The company manufactures Die die-casting parts and high-class Surface Finishing parts for the auto and consumer durable industry. **Technical tie-ups:** Minda Corporation has five 100% subsidiaries

	• Almighty International Pte. Limited • Minda Europe B.V • Minda Instruments Limited • Spark Minda Green Mobility Pvt Ltd • Spark Minda Foundation 3 joint ventures • Minda Infac Pvt Ltd (51%) • Furukawa Minda Electric (25%) Minda Vast Access Systems Private Ltd (50%)
Plant locations - Domestic - 27 manufacturing facilities, 3 design offices and 7 offices. Overseas - 2 manufacturing facilities, 2 offices. **Key Clients -** 2-wheeler - Bajaj, Amphere, Yamaha, Ather, hero 3-wheeler - Bajaj, Mahindra, Mahindra Electric, Piaggio, Atul 4 4 wheeler - Hyundai, Mahindra, Maruti Suzuki, Tata, Vinfast CV - Isuzu, Ashok Leyland, Switch	

Source: Company reports, CRISIL MI&A Consulting

Motherson Sumi Wiring India

Key facts	Brief profile
Year of incorporation: 1986 HQ: Noida, Uttar Pradesh	Motherson Sumi Wiring India Limited offers a wide range of products and services, including - Wiring harnesses for all types of vehicles, from small cars to luxury cars, commercial vehicles, and large trucks; Harness components, such as connectors, terminals, and wire assembly kits; Other electric wires, such as power cables, signal cables, and heater cables; Aftermarket services, such as repair, maintenance, and calibration of wiring harnesses. **Technical tie-ups:** As of FY23, Motherson Sumi Wiring has 204 subsidiaries, 1 associate company and 21 joint ventures.
Plant locations - It has 23 manufacturing facilities present globally along with pan India presence across states like Gujarat, Madhya Pradesh, Maharashtra, Uttarakhand, Uttar Pradesh, Haryana, and Tamil Nadu. **Key clients -**	

Some of the key clients of the company are Maruti Suzuki, Hyundai Motor India, Tata Motors, Mahindra & Mahindra, Ashok Leyland, and Eicher Motors, General Motors Co., Jaguar Land Rover, BMW AG, Daimler AG and Volkswagen AG

Source: Company reports, CRISIL MI&A Consulting

Varroc Engineering Limited

Key facts	Brief profile
Year of incorporation: 1990 HQ: Aurangabad, Maharashtra	Key product segments Varroc Engineering Limited manufacturer and supplier of exterior lighting systems, powertrains, electrical and electronics, and body and chassis parts to passenger car and motorcycle segments. Injection molded components, injection and compression molded automotive rubber products, PU foam, seat assemblies, rearview mirrors, CDI, regular rectifiers, starter and wiper motors, headlamps, tail lamps, blinkers, IC engine valves, crank pins, cold and warm forged. Varroc Engineering Limited operates through 36 manufacturing facilities and 11 engineering centers in 10 countries across three continents. **Technical tie-ups:** Varroc Engineering has 14 subsidiaries, including step-down subsidiaries, and 3 joint ventures
Plant locations - It has 36 manufacturing facilities and 11 engineering centers in 10 countries across three continents. **Key clients -** Some of the key clients of the company are Bajaj Auto Ltd, Honda, Royal Enfield, Yamaha, Suzuki, and Hero	

Source: Company reports, CRISIL MI&A Consulting

Furukawa Minda Electric Pvt Ltd

Key facts	Brief profile
Year of incorporation: 2007 HQ: Bawal, Haryana	Incorporated in 2006, as a joint venture between the Furukawa group (comprising Furukawa Electric Co Ltd and Furukawa Automotive Systems Inc; 51% stake), a leading Japanese auto component manufacturer; and MCL (49% stake). In October 2014, MCL increased its stake to 51%. Key products include wiring harness, and allied components such as couplers, terminals, relay box, junction boxes, steering roll connectors and Battery State

	Sensor for passenger vehicles with more than a decade of presence in Indian Automotive Industry
Plant locations - It has manufacturing plant located in Bawal Haryana along with a service center located in Vithalapur, Gujarat **Key clients -** Include Maruti Suzuki, Force Motors, Renault Nissan, Honda	

Source: Company reports, CRISIL MI&A Consulting

Dhoot Transmission

Key facts	Brief profile
Year of incorporation: 1999 HQ: Pune, Maharashtra	Indian conglomerate which operates the business in products as diverse as Wiring Harness, Electronic Sensors and Controllers, Automotive Switches, Power Cords, Automotive Cables, Connectors and Terminals, suiting to 2-Wheelers, 3-Wheelers, Commercial Vehicles, Off-Road Vehicles, Earth Movers, Farming Equipment's, Medical Equipment's & Domestic Appliances etc. Product divisions include wiring harness, electronic sensors and controllers, automotive switches, power cords, automotive cables, connectors. **Technical tie-ups:** Dhoot Transmission operates with 12 subsidiaries, 1 JV and 3 associate
Plant locations - 22 manufacturing facilities spread across the globe that includes 5 locations in UK, Slovakia, Thailand, Japan & South Korea and 17 locations in India. **Key clients -** Large customer base in 8 countries and 3 continents - Automotive - Bajaj, KTM, Royal Enfield, Yamaha H&LCV - MAN, Eicher, Mahindra, Force, Piaggio	

Source: Company reports, CRISIL MI&A Consulting

Napino Auto and Electronics Limited

Key facts	Brief profile
Year of incorporation: 1991 HQ: Gurgaon, Haryana	Manufactures motor vehicle parts and accessories and offers automotive electronics, electronic fuel management system, instrument cluster, mechatronics, and transmission systems. Leader in its segment with complete design, development, and manufacturing capabilities, Napino offers innovative solutions to major automobile manufacturers. Through its robust R&D capabilities and sustainable partnerships with global players, Napino aspires to lead technology innovation in automotive electronics. Portfolio includes ECUs, capacitor-discharge ignitor, regulator rectifier, wiring harness, handlebar switches, and E Mobility products among other electronic offerings
Plant locations - Manufacturing facilities are located at Manesar, Bhiwadi, Haridwar and Halol. Napino is largest manufacturer of Regulator/Rectifier and Capacitor Discharge Ignitors in India. **Key clients -**	

Large customer base in 8 countries and 3 continents - Automotive - Bajaj, KTM, Royal Enfield, Yamaha H&LCV - MAN, Eicher, Mahindra, Force, Piaggio.

Source: Company reports, CRISIL MI&A Consulting

Presence of players across value chain

Products	*Viney Corp*	*Uno Minda Ltd*	*Minda Corporation (Spark Minda)*	*Motherson Sumi Wiring India*	*Varroc Engineering*	*Furukawa Minda Electric*	*Dhoot Transmission*	*Napino Auto and Electronics Limited*
Wiring Harness								
Terminals								
Connectors								
Rubber Seals								
Moulded parts								
Relays								
PVC wires								
Fuse Boxes								
Switches								
Ties/ Clamps								
Grommets								

Source: Company Annual Reports, CRISIL MI&A Consulting

Peer comparison – Financials

Comparison of key players (Consolidated - fiscal 2022, 2023, 2024)

Rs. Crores	Revenue from operations			Revenue growth			Total income		
	FY22	FY23	FY24	FY22	FY23	FY24	FY22	FY23	FY24
Viney Corp	1,035	1,120	1,246	14.1%	8%	11%	1,085	1,134	1,267
Uno Minda Ltd	8,222	11,084	14,030	31%	35%	27%	8,314	11,237	14,030
Minda Corporation (Spark Minda)	2,727	3,981	4,651	15%	46%	17%	2,977	4,299	4,652
Motherson Sumi Wiring India	5,587	7,023	8,328	43%	26%	19%	5,635	7,057	8,328
Varroc Engineering	5,776	6,796	7,552	-49%	18%	11%	5,855	6,873	7,552
Furukawa Minda Electric	359	353	NA	11%	-2%	NA	359	353	NA
Dhoot TransmissiDhoot Transmissionon	1,213	1,752	NA	17%	44%	NA	1,213	1,752	NA
Napino Auto and Electronics Limited	811	1,031	NA	-5%	27%	NA	815	1,037	NA

	Revenue from operations (INR millions)			Revenue growth			Gross Profit (INR millions)			Gross Profit growth		
	FY22	FY23	FY24	FY22	FY23	FY24	FY22	FY23	FY24	FY22	FY23	FY24
Viney Corp	10,353.74	11,200.64	12,457.86		8.18%	11.22%	4,942.82	5,477.46	6,044.00		10.82%	10.34%
Uno Minda Ltd	83,130.00	112,364.90	140,308.90		35.17%	24.87%	30,410.00	40,120.30	49,671.30		31.93%	23.81%
Minda Corporation (Spark Minda)	29,759.00	43,001.00	46,511.00		44.50%	8.16%	11,000.00	15,228.00	17,273.00		38.44%	13.43%
Motherson Sumi Wiring India	56,350.00	70,679.90	83,282.50		25.43%	17.83%	20,257.00	24,363.00	28,745.00		20.27%	17.99%
Varroc Engineering	58,442.01	68,912.13	75,519.37		17.92%	9.59%	19,948.46	24,606.66	28,186.10		23.35%	14.55%
Furukawa Minda Electric	3,595.02	3,527.75	NA		-1.87%	NA	840.31	838.62	NA		-0.20%	NA
Dhoot Transmission	12,131.82	17,518.48	NA		44.40%	NA	3,543.63	4,821.32	NA		36.06%	NA
Napino Auto and Electronics Limited	8,147.62	10,369.66	NA		27.27%	NA	2,057.36	2,399.72	NA		16.64%	NA

Rs. Crores	EBITDA			EBITDA Margin			Adjusted PAT			Adjusted PAT Margin		
	FY22	FY23	FY24	FY22	FY23	FY24	FY22	FY23	FY24	FY22	FY23	FY24
Viney Corp	140	158	159	12.9%	13.9%	12.5%	14	34	9	1.3%	3.0%	0.7%
Uno Minda Ltd	886	1,242	1,584	10.7%	11.1%	11.3%	407	695	948	4.9%	6.2%	6.8%

Minda Corporation (Spark Minda)	297	466	515	10.0%	10.8%	11.1%	135	279	210	4.5%	6.5%	4.5%
Motherson Sumi Wiring India	754	792	1,020	13.4%	11.2%	12.2%	470	475	638	8.3%	6.7%	7.7%
Varroc Engineering	372	557	774	6.4%	8.1%	10.2%	-112	4	481	-1.9%	0.1%	6.4%
Furukawa Minda Electric	1	0	NA	0.4%	0.0%	NA	-16	-20	NA	-4.5%	-5.5%	NA
Dhoot TransmissiDhoot Transmissionon	128	201	NA	10.6%	11.5%	NA	40	110	NA	3.3%	6.3%	NA
Napino Auto and Electronics Limited	26	43	NA	3.2%	4.1%	NA	-13	5	NA	-1.6%	0.5%	NA

	EBITDA (INR millions)			***EBITDA Margin***		
	FY22	***FY23***	***FY24***	***FY22***	***FY23***	***FY24***
Viney Corp	1,039.43	629.82	1,449.13	10.04%	5.62%	11.63%
Uno Minda Ltd	9,505.50	13,419.10	17,973.10	11.43%	11.94%	12.81%
Minda Corporation (Spark Minda)	3,346.00	4,714.00	5,164.00	11.24%	10.96%	11.10%
Motherson Sumi Wiring India	6,649.00	7,920.00	10,132.00	11.80%	11.21%	12.17%
Varroc Engineering	3,589.06	5,801.62	8,033.97	6.14%	8.42%	10.64%
Furukawa Minda Electric	12.31	-186.74	NA	0.34%	-5.29%	NA
Dhoot Transmission	1,275.45	2,006.36	NA	10.51%	11.45%	NA
Napino Auto and Electronics Limited	162.45	261.40	NA	1.99%	2.52%	NA

Rs. millions	***Gross Fixed Asset Turnover ratio***			***Revenue Split (India) (%)***			***Revenue Split (Outside India) (%)***		
	FY22	***FY23***	***FY24***	***FY22***	***FY23***	***FY24***	***FY22***	***FY23***	***FY24***
Viney Corp	3.64	2.91	3.11	24.48%	24.59%	22.82%	75.52%	75.41%	77.18%
Uno Minda Ltd	4.11	4.54	4.73	85.00%	83.00%	86.00%	15.00%	17.00%	14.00%
Minda Corporation (Spark Minda)	4.13	4.97	4.43	84.00%	84.00%	87.00%	16.00%	16.00%	13.00%
Motherson Sumi Wiring India	31.5	23.06	22.10	99.50%	99.60%	NA	0.50%	0.40%	NA
Varroc Engineering	3.31	4.04	4.48	79.00%	82.00%	87.00%	21.00%	18.00%	13.00%
Furukawa Minda Electric	5.28	5.78	NA	NA	NA	NA	NA	NA	NA
Dhoot Transmission	3.36	4.66	NA	79.00%	83.00%	NA	21.00%	18.00%	NA
Napino Auto and Electronics Limited	5.51	7.38	NA	NA	NA	NA	NA	NA	NA

Note: *Standalone numbers for FY 2023 and FY 2022 are considered for Furukawa Minda, Dhoot Transmission, Napino Auto and Electronics Limited*

Operational EBITDA for Varroc has been computed basis considering continued operation

1. *Revenue from Operations means the revenue from operations for the period / year.*
2. *Growth in revenue from operations (%) is calculated as a percentage of Revenue from Operations of the relevant period / year minus Revenue from Operations of the preceding period / year, divided by Revenue from Operations of the preceding period / year.*
3. *Gross Profit is calculated as Revenue from Operations – Cost of raw materials & components consumed – Purchases of traded goods - Change in inventories of finished goods, traded goods and work-in-progress*
4. *Growth in gross profit (%) is calculated as a percentage of gross profit of the relevant period / year minus gross profit of the preceding period / year, divided by gross profit of the preceding period / year.*
5. *EBITDA is calculated as Profit/(loss) before tax plus finance cost, depreciation and amortization expense less other income.*
6. *EBITDA Margin is the percentage of EBITDA divided by Revenue from Operations*
7. *Operational EBITDA is calculated as PBT before exceptional items + interest + depreciation and amortization – other income.*
8. *Operational EBITDA Margin (%) is the percentage of EBITDA divided by Revenue from Operations.*
9. *Debt to Equity is calculated as Total Debt (Current and Non-Current borrowings)/Total Equity*
10. *Fixed Assets Turnover Ratio is calculated as revenue from operations for the period / year divided by property, plant and equipment.*
11. *Revenue split (India) (%) is overall revenue from India*

Source: Company Annual Reports, CRISIL MI&A Consulting

Business segment wise revenue share for key players

Rs. Crores	*Revenue from operations*			*Revenue growth*			*Total income*		
	FY22	*FY23*	*FY24*	*FY22*	*FY23*	*FY24*	*FY22*	*FY23*	*FY24*
Viney Corp	1,035	1,120	1,246	14.1%	8%	11%	1,085	1,134	1,267
Uno Minda Ltd	8,222	11,084	14,030	31%	35%	27%	8,314	11,237	14,030
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Dhoot TransmissiDhoot Transmissionon	1,213	1,752	NA	17%	44%	NA	1,213	1,752	NA
Napino Auto and Electronics Limited	811	1,031	NA	-5%	27%	NA	815	1,037	NA

Business segments	*Viney Corp*			*Minda Corporation*			*Uno Minda Ltd*			*Motherson Sumi Wiring India*			*Varroc Engineering*		
	2022	*2023*	*2024*	*2022*	*2023*	*2024*	*2022*	*2023*	*2024*	*2022*	*2023*	*2024*	*2022*	*2023*	*2024*
Wiring and Harness	*24.44%*	*26.25%*	*24.25%*	*NA*	*30%*	*30%*	*NA*	*NA*	*NA*	*97%*	*90%*	*NA*	*NA*	*NA*	*NA*
Mechatronics	*75.56%*	*73.75%*	*75.75%*	*NA*	*NA*	*NA*	*28%*	*29%*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
Lockset	*NA*	*NA*	*NA*	*NA*	*25%*	*24%*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
Die Casting	*NA*	*NA*	*NA*	*NA*	*15%*	*16%*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
Instruments Clusters	*NA*	*NA*	*NA*	*NA*	*14%*	*15%*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*

Lighting	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*22%*	*23%*	*NA*	*NA*	*NA*	*NA*	*24%*	*14%*	*NA*
Acoustics	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*8%*	*7%*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
Castings	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*18%*	*19%*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
Seatings	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*11%*	*9%*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
Magneto, Regulator Rectifier, CDI	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*21%*	*17%*	*NA*
2 Starter Motor	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*5%*	*6%*	*NA*
Lighting, PCB, Dashboard, Switches, EV (TCMU , BMS, DC-DC), Catalystic con, ECU, , Sensors, etc, Crankpin, Engine Valve (2\3 W)	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*18%*	*31%*	*NA*
Gear, other	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*6%*	*NA*
Crankshaft, shaft	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*8%*	*NA*
Steel forged products	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*13%*	*NA*	*NA*
Engine Valve (4 W, others)	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*4%*	*NA*
Automobile parts in Aftermarket	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*15%*	*15%*	*NA*
Plastic moulded products	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*4%*	*NA*	*NA*
Others	*NA*	*NA*	*NA*	*NA*	*16%*	*15%*	*13%*	*13%*	*NA*	*3%*	*10%*	*NA*	*NA*	*NA*	*NA*

Note:

1. *Revenue share not available for Furukawa Minda, Dhoot Transmission, Napino Auto and Electronics Limited*
2. *Mechatronics share for Uno Minda is for switches*
3. *Wiring & Harness share for Viney Corp is for Connective products*
4. *Wiring Harness share for Motherson Sumi is for Wiring Harness & its Components (Polymer & Modules, Vision Systems)*
5. *Lightning share for Varroc is for 4W Lightning*

***Source**: Company Annual Reports, CRISIL MI&A Consultin*

8. Domestic Market sizing and outlook of components

Overview of the auto component segments.

The company primarily deals into connective products, mechatronics products, fuse box, relays, and rubber components. Connective products which include Wiring Harness (Device harness, Main Harness, Terminals and Connectors) and Mechatronics which includes Switches.

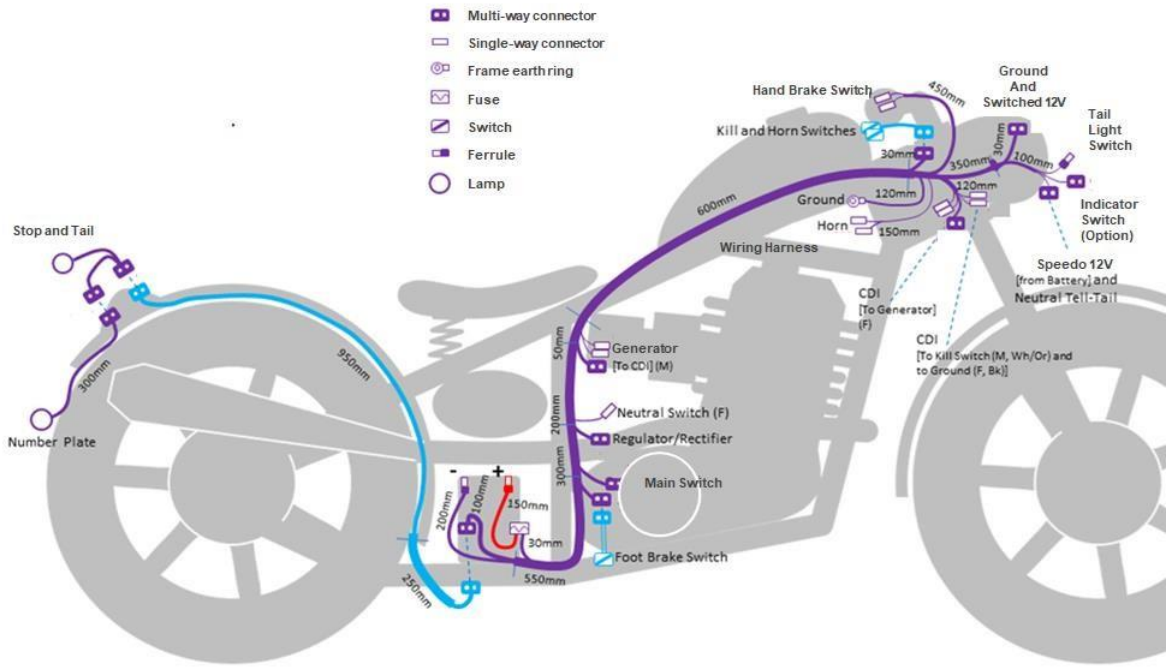
Manufacturing category vehicle wise market size scope table

Segment	Product	Vehicle segment (ICE + EV)	Channel
Connective products	Device harness	2W, PV	OEM
	Main harness	2W, PV	OEM
	Terminals	2W, PV	OEM
	Connectors	2W, PV	OEM
Mechatronics	Switches	2W, PV	OEM

The mobility industry is experiencing significant increase in complexity of the products due to the transformative shift across the globe due to the increasing electrification of vehicles, significantly impacting connective products and mechatronics such as wiring harness, terminals, connectors and switches. This shift is reshaping the competitive landscape, with a distinct advantage for players who possess expertise in high technology. This complexity is expected to translate into a higher value per vehicle, further emphasizing commitment to deliver innovative solutions that align with the evolving demands of the automotive industry.

Figure: Sample picture on Connective products and Mechatronics in a Passenger vehicle

Figure: Sample picture on Connective Products and Mechatronics in a Motorcycle



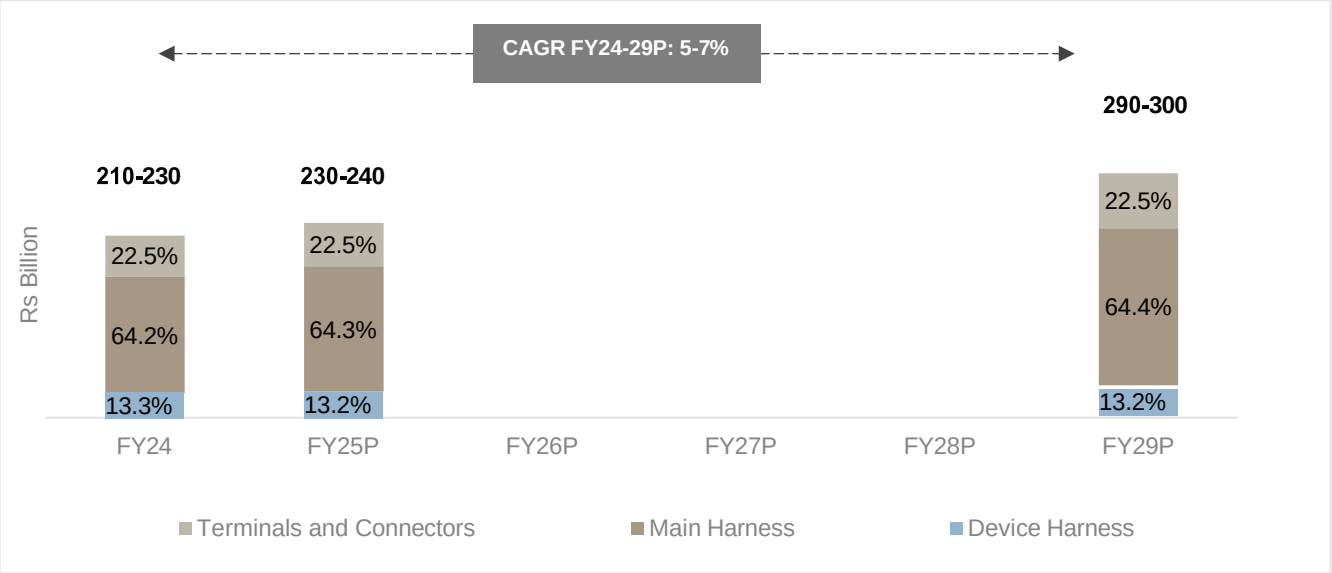
Connective Products

In automotive engineering, connective products refer to the various means by which different components and systems within a vehicle are electrically and mechanically connected. These systems are crucial for ensuring that all parts of the vehicle function together seamlessly. These systems encompass electrical, mechanical, and fluid connections, each playing a vital role in vehicle performance and reliability. Electrical connection systems include wiring harnesses, connectors, and bus systems, such as CAN and LIN, which facilitate communication between electronic control units (ECUs), sensors, and actuators, ensuring coordinated operations and efficient data exchange. These systems are designed and integrated with precision, considering the vehicle's specific requirements and environmental conditions, and are subjected to rigorous quality control during manufacturing and assembly.

Mechanical connection products consist of fasteners, clips, clamps, and mounting brackets that secure components in place, absorbing vibrations and maintaining structural integrity. Fluid connection products, involving hoses, tubes, couplings, and fittings, enable the transport of essential fluids like coolant, fuel, and brake fluid throughout the vehicle. These systems are designed and integrated with precision, considering the vehicle's specific requirements and environmental conditions, and are subjected to rigorous quality control during manufacturing and assembly. Regular maintenance and inspections of these connective products are essential to detect and address potential issues such as wear, corrosion, or damage, ensuring the vehicle remains safe and operational throughout its lifespan.

Consulting

Connective Products market size – ICE (fiscals 2024-29P)



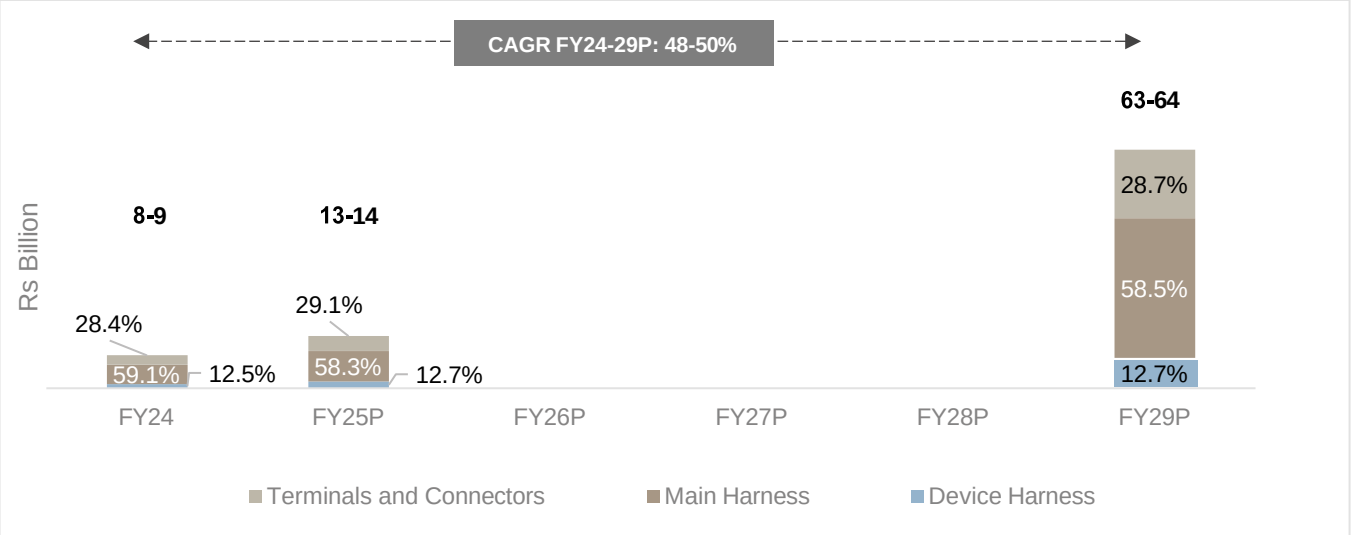
Source: CRISIL MI&A

ICE Device Wiring Harness market is estimated between Rs 29-30 billion in fiscal 2024 and expected to grow at 5-6% CAGR over the next five years through fiscal 2029 to reach Rs 38-40 billion.

The main harness is the car's central wiring system. It links the engine, dashboard, and rear of the vehicle. It's comparable to a major highway where all smaller routes come together. ICE Main wiring harness market is estimated around Rs 140-145 billion in fiscal 2024. The market is projected to grow at a 6-7% CAGR over the forecast period to reach Rs 185-195 billion by 2029.

Market for Terminal and Connector is estimated between Rs ~49-51 billion in fiscal 2024 and expected to grow at 5-7% CAGR over the next five years through fiscal 2029 to reach Rs 65-67 billion.

Connective Products market size – EV (fiscals 2024-29P)



Source: CRISIL MI&A

Consulting

Domestic market Sizing

Wiring Harness

The wiring harness is the combination of electrical cables, or assembly of wires, that connects all electrical and electronic (E/E) components in the automotive vehicle, like sensors, electronic control units, batteries, and actuators. It handles the energy and information flow within the E/E system to fulfil primary car functions, such as steering and braking as well as secondary car functions, such as ventilation and infotainment. Automobiles and other road vehicles such as trucks and buses are one of the most demanding applications for mechanical and electrical design. The electrical systems in these applications must operate properly over a wide range of environmental conditions, facing extreme temperature, humidity, sunlight, dirt, vibration, and more. The electrical system must also meet user expectations of reliability and mandatory safety-critical design practices. With the growing focus on autonomous driving, advanced driver assistance systems (ADAS), and infotainment platforms, a sophisticated electrical system that underlies the vehicle must be handled efficiently and should not generate any electrical hazards for the safety of the passengers and vehicle as well.

Since automotive wiring harnesses connect various electrical components, they feature diverse connection circuits. The circuits, also referred to as wire lengths, serve distinct purposes. A standard automotive wiring harness typically contains 12 of these circuits - Dash lights, Gauges, Hazard flasher, Heat and AC, Horn, Parking lights, Radio, stop lights, Tail lights, Turn signals, Wipers.

.

Source: Viney Corporation Pvt Ltd

Content per Vehicle (Volume)

Vehicle Segment	Scooter		Motorcycle	
Model / Components	ICE	EV	ICE	EV
Device Wiring Harness	10-11	10-11	12-13	12-13
Main Wiring Harness	1	1	1	1

Consulting

Source: Viney Corporation Pvt Ltd

Note: For vehicle segment, average Intensity has been considered for top 2-3 selling scooters and Motorcycles

The value per vehicle in the EV segment surpasses that of ICE vehicles by upto 3 times.

Types of wiring harness market such as device harness and main harness serve distinct functions within an automotive electrical system:

Main Wiring Harness

- Function: Acts as the primary electrical backbone of the vehicle, distributing power and signals to various systems and subsystems throughout the vehicle
- Components: Typically includes connections to the engine, dashboard, lights, doors, and other major components
- Complexity: Highly complex due to the need to connect multiple systems, manage high power loads, and ensure reliable communication across the vehicle
- Cost: Generally, more expensive to produce due to the complexity, length, and the need for robust insulation and protection against environmental factors

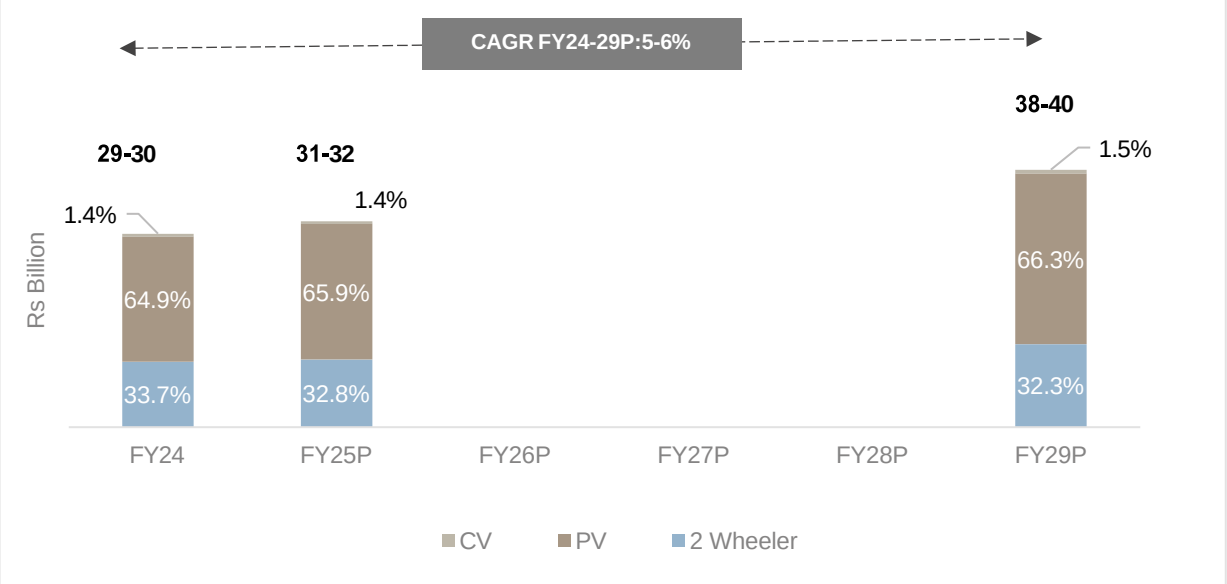
Device Wiring Harness

- Function: Connects individual devices or components to the main wiring harness or directly to power sources. Examples include wiring for the radio, air conditioning, or individual sensors.
- Components: Usually simpler, focusing on a specific device or set of closely related devices
- Complexity: Less complex than the main harness, as it deals with fewer connections and typically lower power loads
- Cost: Less expensive to produce due to its simplicity and smaller scope

Main wiring harness is more expensive and complex to produce due to its extensive role in connecting and managing the vehicle's entire electrical system, requiring advanced materials and design to ensure reliability and safety.

Device Wiring Harness market size – ICE (fiscals 2024-29P)

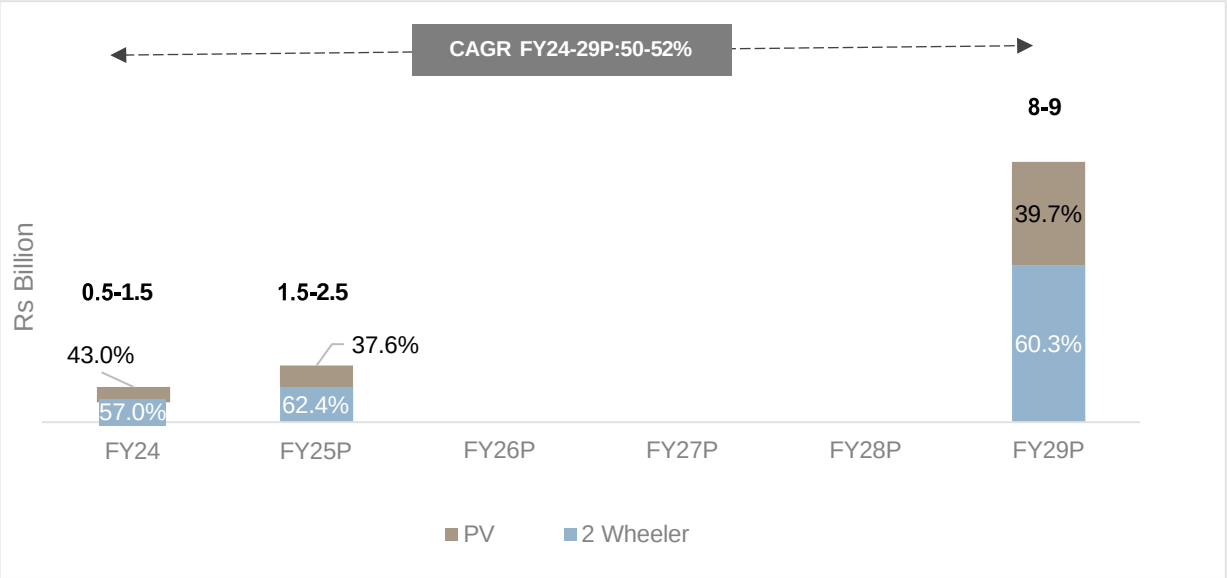
ICE Device Wiring Harness market is estimated between Rs 29-30 billion in fiscal 2024 and expected to grow at 5-6% CAGR over the next five years through fiscal 2029 to reach Rs 38-40 billion.



Consulting

Source: CRISIL MI&A

Device Wiring Harness market size – EV (fiscals 2024-29P)



Source: CRISIL MI&A

Note: Market sizing includes only for 2-wheelers and PV

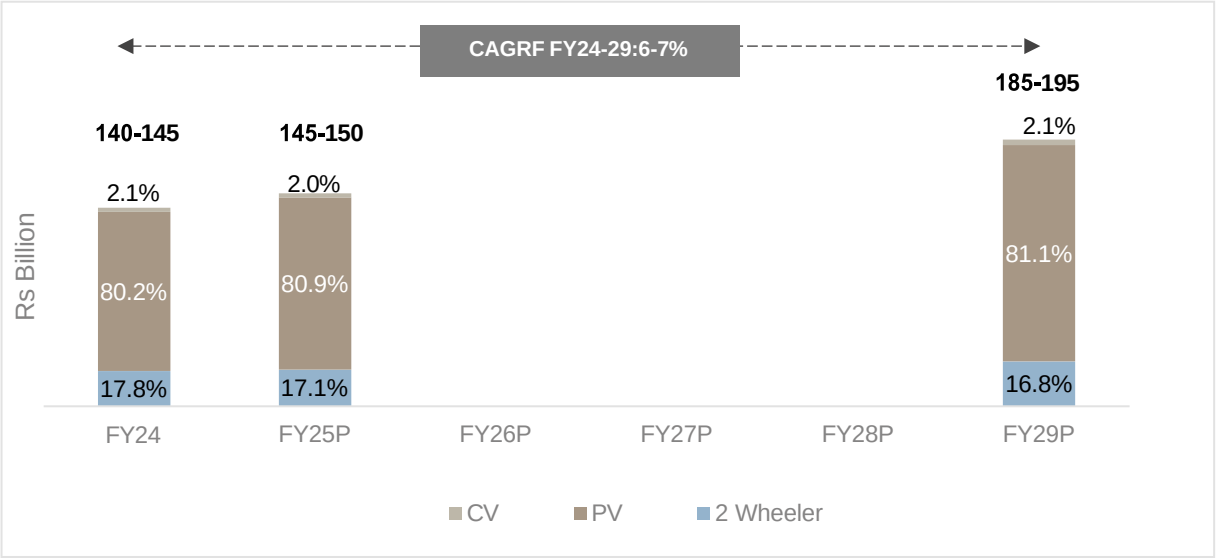
Almost all vehicle segments are expected to experience robust production growth from fiscal years 2024 to 2029. This growth in the device market will primarily be driven by the two-wheeler segment, followed by passenger vehicles. The commercial vehicle segment holds a negligible share, accounting for only 0.4% in FY24.

Within the two-wheeler segment, the device harness market share is divided between motorcycles and scooters, accounting for 77% and 23% respectively. Similarly, passenger vehicle segment can be divided into economy (Hatchbacks and Van) and premium (Sedan and UV) sections, contributing ~38% and ~62%, respectively within PV.

Main Wiring Harness market size – ICE (fiscals 2024-29P)

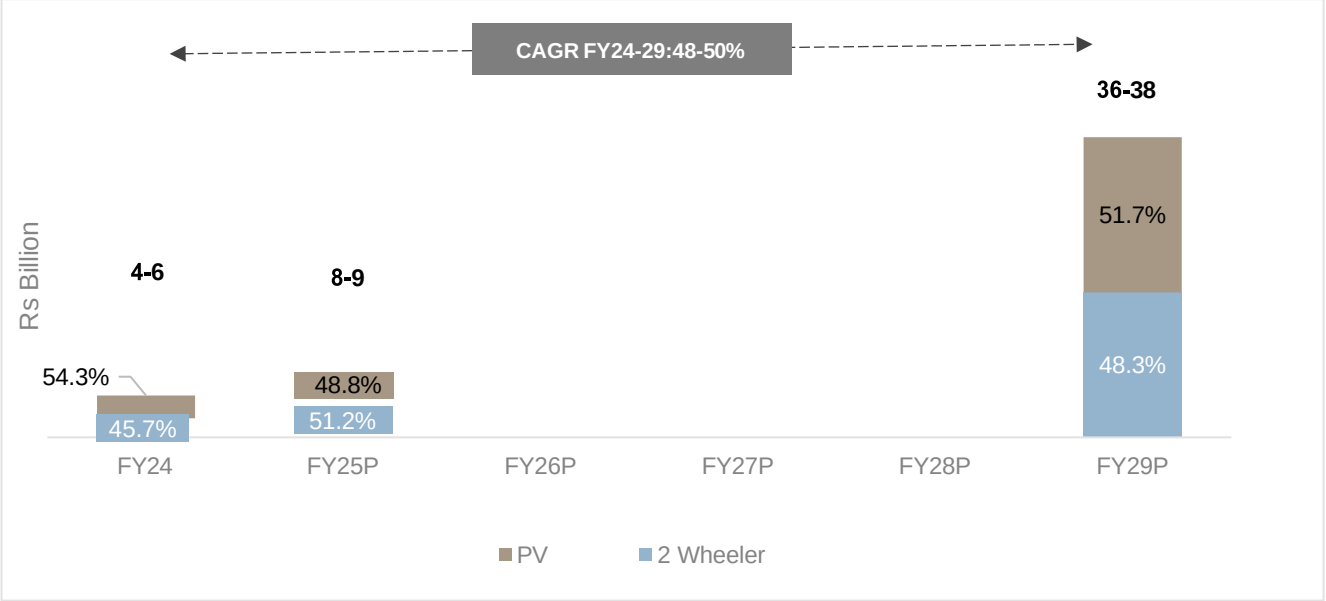
The main harness is the car's central wiring system. It links the engine, dashboard, and rear of the vehicle. It's comparable to a major highway where all smaller routes come together.

ICE Main wiring harness market is estimated around Rs 140-145 billion in fiscal 2024. The market is projected to grow at a 6-7% CAGR over the forecast period to reach Rs 185-195 billion by 2029



Source: CRISIL MI&A

Main Wiring Harness market size – EV (fiscals 2024-29P)



Source: CRISIL MI&A

Note: Market sizing includes only for 2-wheelers and PV

In the electric vehicle sector, terminals and connectors make up to 50-55% of the total market size of the EV main wire harness market.

In the overall main wiring harness market, scooters make up to 30% and the remaining 70% is contributed by motorcycle.

Transition of wire harness technology- EV

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1) High and Low Voltage: EV car wiring harness can be high and low voltage, with high voltage wiring harness occupying large proportion; Traditional fuel vehicles mainly rely on low voltage wiring harnesses.
2) Communication: The traditional fuel car wiring harnesses mainly serves as a power supply, while the EV car wiring harnesses not only for power supply, but also need to transmit signals.
3) Anti interference: The interference of fuel car wiring harnesses is relatively low, but EV car wiring harnesses need to undergo anti-interference treatment to avoid interference and failure during signal transmission.
4) Production process and technical requirements: Wiring harness of EV vehicles operates in high current and high voltage environments, requiring higher requirements in terms of delivery capacity, mechanical strength, insulation protection, and electromagnetic compatibility.

In addition, installation position of the motor and battery of EV vehicles also requires the high voltage wiring harness to be routed outside the vehicle, so its mechanical protection is very important. Higher requirements have also been put forward for the shielding performance, anti-interference performance and sealing performance of high-voltage wiring harnesses.

Wire Harness Market: Growth Factors and Dynamics

Increase in Vehicle Electrification

- Electric Vehicles (EVs): Rise in production and sales of electric vehicles (EVs) demands more complex and extensive wiring harness systems to handle high-voltage power distribution and communication between numerous electronic control units (ECUs)
- Hybrid Vehicles: Similar to EVs, hybrid vehicles require sophisticated wiring harnesses to manage both internal combustion engine and electric motor systems.

Advanced Driver Assistance Systems (ADAS) and Autonomous Driving

- Sensor Integration: ADAS and autonomous driving technologies rely on numerous sensors, cameras, and radars, all of which need reliable connections provided by wiring harness systems.
- Data Transmission: The need for high-speed data transmission between various systems to ensure real-time processing and decision-making increases the complexity and extent of wiring harnesses.

Increased Connectivity and Infotainment Systems

- In-Car Entertainment: Modern vehicles are equipped with advanced infotainment systems that include touchscreens, audio systems, and connectivity features (e.g., Bluetooth, Wi-Fi), requiring extensive wiring
- Telematics: Integration of telematics for fleet management, navigation, and remote diagnostics necessitates additional wiring infrastructure

Demand for Lightweight and Compact Designs

- Weight Reduction: Automakers strive to reduce vehicle weight for better fuel efficiency and performance, leading to the development of lightweight wiring materials and more efficient harness designs.
- Space Optimization: The need to optimize space within increasingly compact vehicle designs drives innovation in wiring harness layouts.

Terminals

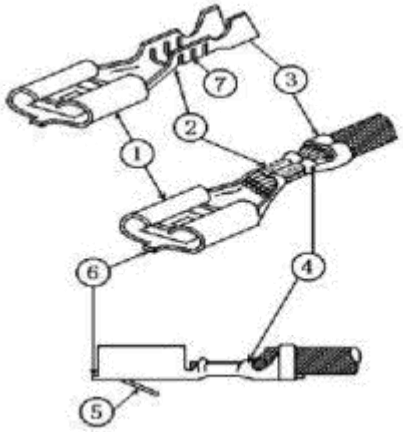
Automotive wire terminal is an essential component of the automotive electrical system, responsible for transmitting current, signals, and important data. It plays a crucial role in the normal operation of the vehicle's electrical system. With the rapid development of the automotive industry, the importance of automotive wire terminals has been well recognized. Therefore, various electrical appliances with different characteristics are emerging in the automotive industry, leading to higher requirements for the electrical performance of automotive wire terminals. It is therefore

Consulting

imperative that these terminals be of high quality, given their crucial role in the automotive wiring harness and the vehicle electrical system.

Structure and Functions of Terminals

The automotive wire terminal consists of several parts, including the contact end, wire barrel, insulation cylinder, bell-shaped inlet sleeve, spear hook, truncated piece, and jagged protrusions.



1. The contact end is the part that contacts the power supply with the pin holder,
2. Wire barrel is the part that crimps the conductor
3. Insulation cylinder is the part that fixes the wire's insulation
4. Bell-shaped inlet sleeve protects the wire from breakage and surface wear
5. Spear hook is the locking hook when inserted into the shell
6. Truncated piece is the residual part after the material tape is cut off
7. Jagged protrusions are the grooves in the wire barrel that ensure good wire contact

Commonly used materials for auto industry electric terminals include various grades of steel, copper, brass, phosphor bronze, various silver oxides, various metal plating such as tin to enhance fretting and corrosion resistance.

Plug Terminals

Series Terminals

Splice & mid joint terminals

Consulting

Ring Terminals

Flag Terminals

Contact Patti type terminals

Source: Viney Corporation Pvt Ltd

Connectors

Automotive wire harness is an assembly of the connectors, cables, and terminals spread throughout the vehicle and connectors are responsible for transmitting electric power and information to different components within your car. There are different types and varieties of connectors used by automakers; for example, printed circuit boards connectors, circular connectors, rectangular connectors, charging connectors, etc.

These connectors connect or disconnect the electrical lines and consist of male and female terminals. Male and Female terminals are collectively combined and linked to the electrical connection, which results in fulfilling your desired action (e.g., automatic window or stereo system)

Main functions of the Automotive Wire Harness Connector

Internal Connectivity: These connectors link the internal components of the car, such as the stereo systems and sensors.

External connectivity: Connectors are used during car repairs to help mechanics assess the vehicle's condition by connecting it to external equipment via an external connector.

Replacement: Connectors can also be used to temporarily replace other connected devices. During this period, they play a crucial role, allowing you to continue using your vehicle.

Characteristics of Automotive Wire Harness Connector

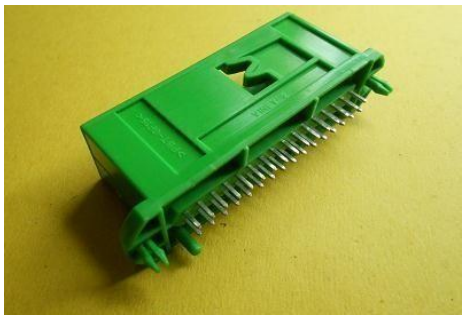
It is well-known that automotive connective products must meet high standards due to various environmental factors affecting vehicle functionality. OEMs (Original Equipment Manufacturers) ensure technical reliability remains high, considering conditions like vibrations, brake fluid, engine oil, and high temperatures.

It is crucial that the various connections within vehicles can be connected or disconnected under harsh working conditions. As a result, manufacturers prioritize developing robust connective products to ensure optimal car performance.

Series Connectors

Hybrid Connectors

CDI connectors



PCB type Connectors

Special Connectors

Application of Terminals and Connectors in Automotive:

Primary purpose of terminals and connectors in automotive passenger vehicles is to facilitate secure, reliable, and efficient electrical connections between various components and systems. These connections are critical for the proper functioning of the vehicle's electrical and electronic systems.

1) Engine and Powertrain Systems
   Application: Connectors and terminals are used in the engine compartment to connect the ECU, fuel injectors, ignition coils, sensors (e.g., oxygen sensors, temperature sensors), and actuators (e.g., throttle actuators)
   Example: High-temperature resistant connectors and terminals designed to withstand the harsh environment of the engine bay

2) Lighting Systems:
   Application: Used for headlights, taillights, turn signals, brake lights, and interior lighting. These connectors must be weatherproof, especially for exterior lights.
   Example: Quick-disconnect connectors allowing for easy replacement of bulbs and entire lighting assemblies.
3) Infotainment and Communication Systems
   Application: Connectors are used to link the infotainment system to various inputs and outputs, such as speakers, microphones, GPS antennas, and control buttons
   Example: Multi-pin connectors that facilitate the transmission of audio, video, and data signals

4) Safety and Driver Assistance Systems
   Application: Critical for connecting airbags, seatbelt pretensioners, ABS (anti-lock braking system) sensors, and ADAS components like cameras, radar, and lidar sensors.
   Example: High-reliability connectors that ensure consistent performance in safety-critical applications

5) HVAC Systems

Consulting

Application: Connectors and terminals link the HVAC control unit to various sensors, actuators, and the blower motor
Example: Connectors designed to handle the varying electrical loads and provide secure connections in confined spaces

6) Battery and Charging Systems:
Application: Connectors for the main battery terminals, alternator connections, and charging system components
Example: High-current connectors capable of handling the significant power demands of starting the engine and charging the battery

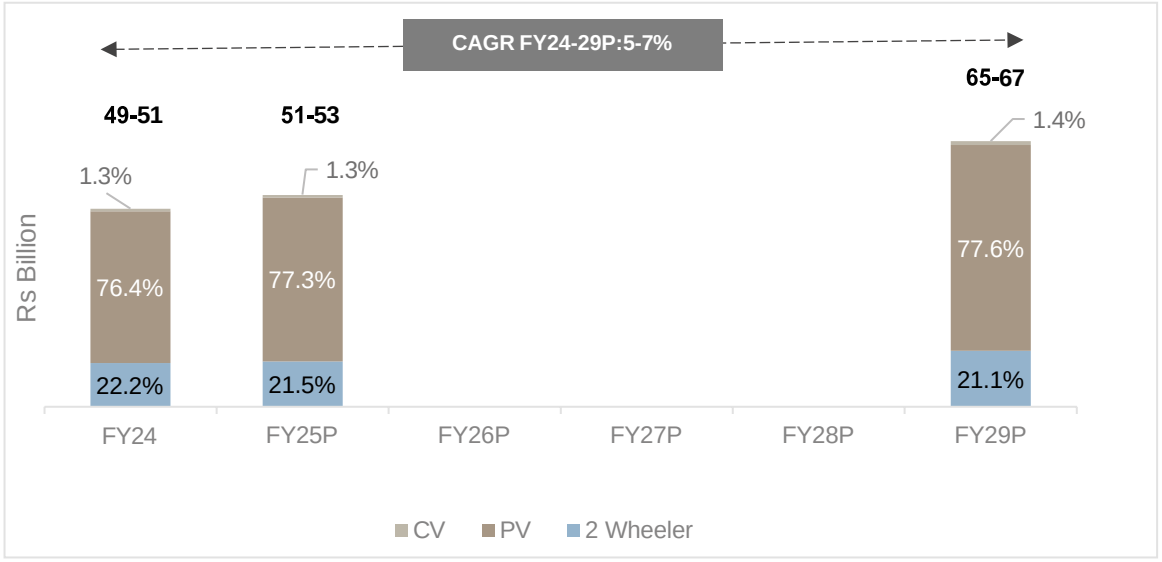
7) Chassis and Body Systems
Application: Wiring harnesses and connectors for power windows, door locks, mirrors, and seat controls.
Example: Flexible connectors that accommodate the movement of doors and seats without losing connection or causing wear

Transition of terminal and connector- EV

The shift to electric vehicles (EVs) will significantly increase the demand for terminals and connectors, driven by the need for more complex electrical systems and innovative products. This transition necessitates the development of advanced, reliable, and cost-effective connectors and terminals. Technological advancements will be required to handle high voltages (up to 800V in some EVs) and currents, along with improved insulation and safety features. Additionally, EVs will demand space-efficient designs with smaller, more compact connectors to fit within the limited space of modern vehicle architectures. The use of lightweight materials, such as aluminium and advanced polymers, will help reduce the overall weight of the vehicle. Furthermore, the content per vehicle will increase, as EVs require more electrical connections than internal combustion engine (ICE) vehicles due to the addition of sensors, control units, and communication interfaces. The complexity of wiring will also rise, with more extensive and intricate wiring harnesses leading to an increased number of terminals.

Terminals and Connectors market size – ICE (fiscals 2024-29P)

Market for Terminal and Connector is estimated between Rs ~49-51 billion in fiscal 2024 and expected to grow at 5-7% CAGR over the next five years through fiscal 2029 to reach Rs 65-67 billion



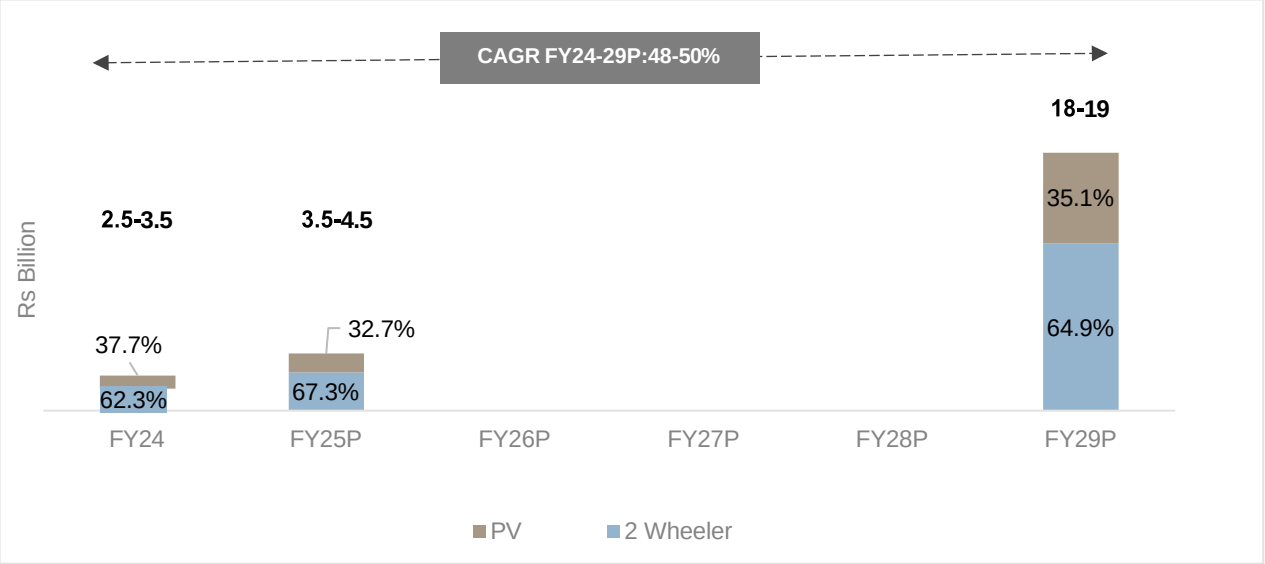
Source: CRISIL MI&A

Two-wheeler segment has the largest contribution with ~76%, primary drivers of this growth are the rising demand for two-wheelers and the increasing focus on safety and convenience features. The increasing adoption of advanced technologies in two-wheelers, such as fuel injection systems and LED lighting, is driving the demand for more sophisticated and reliable connectors. Furthermore, the market is also witnessing the emergence of waterproof and dustproof terminal connectors to enhance the durability and performance of two-wheelers in challenging environments. These connectors are particularly in demand on off-road and adventure motorcycles.

The passenger vehicle segment contribute around ~24% to the overall market size- segment emphasis on increasing fuel efficiency and lowering emissions, there is a trend towards building lightweight and compact automotive terminals and connectors. These smaller, more efficient terminals assist in reducing the overall weight of the vehicle, resulting in improved performance and a lower environmental effect.

Terminals and Connectors constitute approximately 30-32% of the basic operating model of the wiring harness structure

Terminals and Connectors market size – EV (fiscals 2024-29P)



Source: CRISIL MI&A

Note: Market sizing includes only for 2-wheelers and PV

A clear shift in consumer preference is observed in the two-wheeler market and sales of high-speed electric two wheelers increased substantially in FY23. Market growth in the EV segment would be driven by two-wheelers, majorly the scooter segment. EV adoption in the two-wheeler segment will be largely driven by urban scooter buyers, as cost of ownership in case of electric scooters will be less than ICE scooters. The electric two-wheeler penetration is expected to reach 28-30% by fiscal 2029 while PVs are expected to drive the EV market in the long term due to lower battery cost, improved charging infrastructure and availability of wide range of models by fiscal 2029.

Mechatronics

Mechatronics in automotive vehicles, specifically regarding switches, refers to the integration of mechanical, electronic, and computer systems to create advanced control and automation systems. These mechatronic switches enhance the functionality, efficiency, and reliability of automotive systems.

Benefits

- Enhanced functionality: Mechatronic switches allow for more complex and integrated functions, improving the overall user experience.
- Improved safety: Advanced control systems enhance vehicle safety by providing better control and automation of critical functions.
- Increased efficiency: Electronic controls optimize mechanical operations, leading to improved fuel efficiency and reduced emissions.
- Greater reliability: Combining electronics with mechanical systems reduces wear and tear, leading to longer-lasting component.

Switches

Automotive switches are integral to the proper function of any vehicle and come in a variety of shapes and sizes each with its own specific function. Some of the most common automotive switches are the starter switch, ignition switch, headlight switch, turn signal switch, and wiper switch. All these switches are important, as they provide protection against overload, overheating, and short circuits. If one switch is turned off, it can affect the entire system. Automotive switches are suitable for a wide range of automotive and industrial applications.

Switches market is driven by several factors such as the increasing demand for advanced features in vehicles including automated driving and advanced safety systems, which require sophisticated switch technology.

Additionally, the growing demand for electric and hybrid vehicles has further increased the demand for automotive switches, as these vehicles need more electrical switches than traditional vehicles. The market for automotive switches is also driven by technological advancements, which have led to the development of more advanced and efficient switch technology. For instance, the use of micro-electromechanical systems (MEMS) and other advanced technologies has led to the development of smaller and more precise switches, which are more reliable and efficient.

Types and Functions

Multi-Functional Switches

- Steering Wheel Controls: Integrate multiple functions such as audio control, cruise control, and phone connectivity into a single module on the steering wheel.
- Touch-Sensitive Controls: Use capacitive touch technology to detect user inputs, offering a sleek and modern interface.

Electronic Control Modules (ECMs)

- Transmission Control: ECMs manage the transmission system, ensuring smooth gear changes and optimal performance.
- Engine Control: Regulate engine functions for better fuel efficiency, performance, and emissions control.

Smart Actuators

- Power Windows and Seats: Combine mechanical movement with electronic control to provide smooth and precise adjustments.
- Adaptive Lighting: Adjust headlights based on driving conditions, enhancing safety and visibility.

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Sensors and Feedback Systems

- Pressure and Temperature Sensors: Monitor critical parameters and provide feedback to control systems to maintain optimal performance.
- Proximity Sensors: Used in parking assistance systems to detect obstacles and aid in safe maneuvering.

Automatic Gear Selector, DNA Switch

Automatic Gear Selector, DNA Switch

Airbag Deactivation Switch

Engine Start, Stop Switch

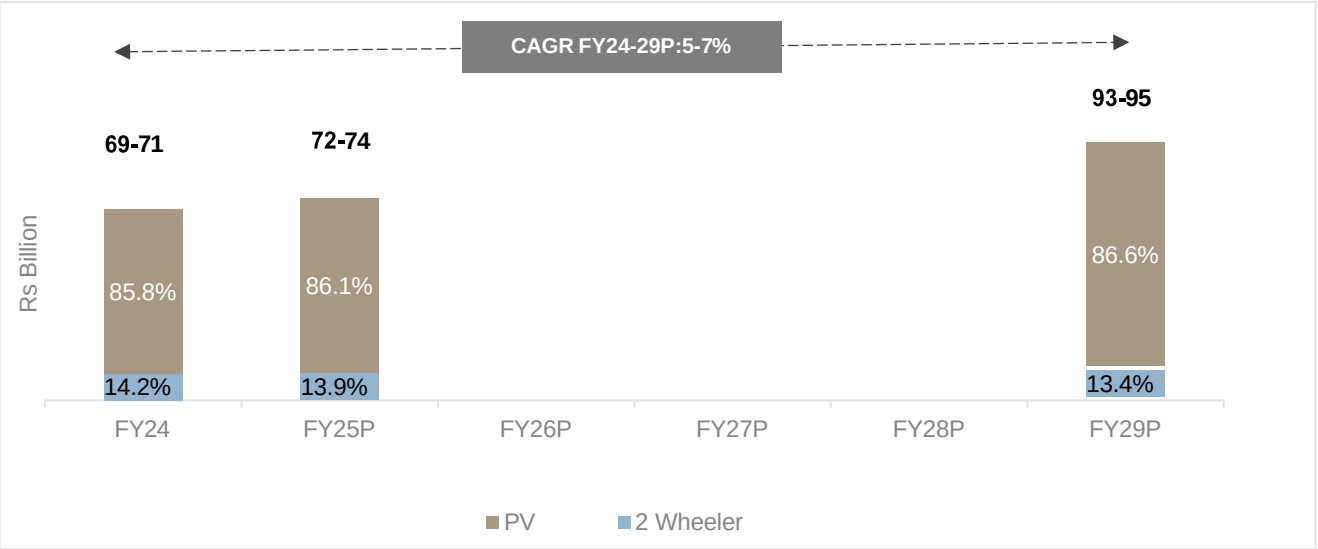
Headlight Switch

Multimedia Plugs

Consulting

Switches market size – ICE (fiscals 2024-29P)

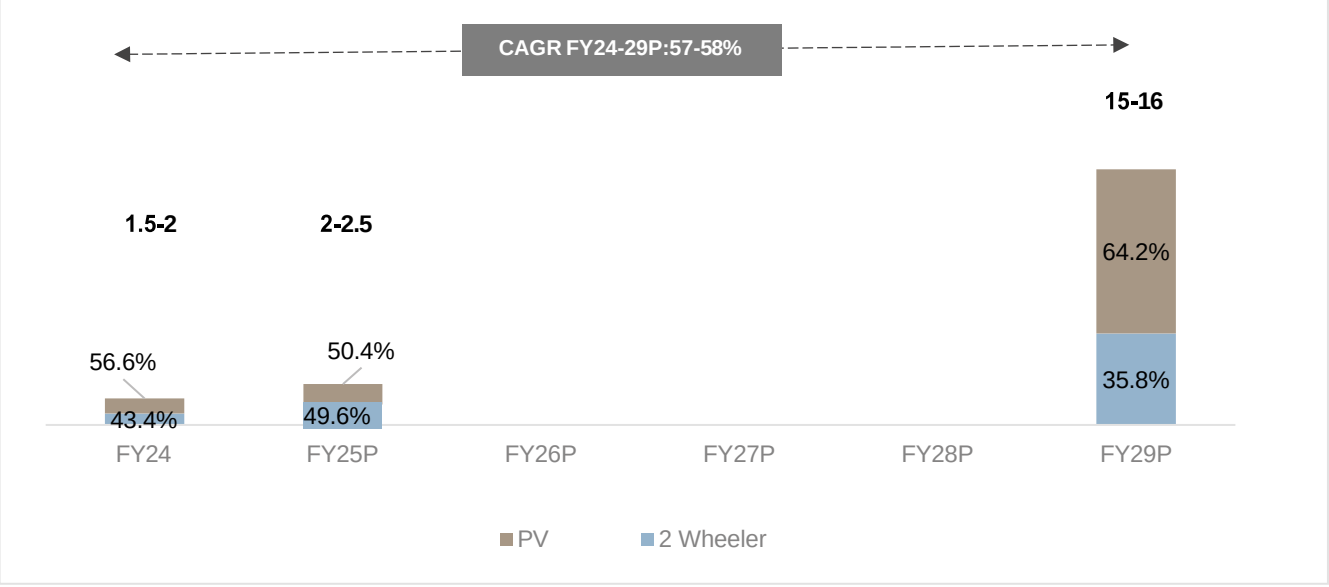
Market for Switches is estimated between Rs 69-71 billion in fiscal 2024 and expected to grow at 5-7% CAGR over the next five years through fiscal 2029 to reach Rs 93-95 billion.



Source: CRISIL MI&A

Switches market size – EV (fiscals 2024-29P)

Market for Switches is estimated between Rs 1.5 to 2 billion in fiscal 2024 and expected to grow at 57-58% CAGR over the next five years through fiscal 2029 to reach Rs 15-16 billion.



Source: CRISIL MI&A

Switches Market: Growth Factors and Dynamics

1. Vehicle Electrification and Connectivity: The rapid shift toward vehicle electrification and increasing connectivity demands have led to a surge in demand for advanced switches. These switches are vital components that facilitate the seamless operation of various vehicle systems, aligning with the evolving landscape of electric and connected vehicles.
2. Safety Regulations and Advanced Features: Stricter safety regulations and consumer demand for enhanced safety features have compelled automakers to integrate sophisticated switches. Advanced switches are instrumental in implementing critical functions such as airbags, electronic stability control, and lane departure warning systems, contributing to heightened vehicle safety.
3. Interior Aesthetics and User Experience: With the growing emphasis on interior aesthetics and user comfort, automotive switches are evolving from more functional components to design elements. Manufacturers are focusing on switches that offer tactile feedback, intuitive operation, and cohesive design, enhancing the overall cabin ambience and user experience.
4. Smart and Autonomous Driving: The rise of smart and autonomous driving technologies necessitates switches that accommodate new functionalities. These switches enable driver assistance features, adaptive cruise control, and autonomous modes, playing a pivotal role in the transition towards self-driving vehicles.
5. Rapid Technological Advancements: The automotive switches market is witnessing rapid technological innovations, including touch-sensitive interfaces, capacitive buttons, and voice command integration. These advancements provide seamless and futuristic control options, aligning with the tech-savvy preferences of modern consumers.

9. Review and outlook on the Global Passenger Vehicle Switches Industry

Globally, car sales have driven the global automotive production and sales. The passenger car ecosystem is deeply driven by several micro and macro factors that have kept the overall demand on the higher side. Shifting consumer stance on the body type in the passenger segment, preferably sports utility vehicles and sedans, has encouraged the global demand scenario. Passenger car sales are witnessing growth across the globe, with leading car brands, including Volkswagen, Nissan, General Motors, and Ford, leading the forefront. Several countries across the globe are mitigating passenger car sales, with the majority of sales taken by conventional cars, including diesel and gasoline. Countries like China, India, the United States, and Germany are some of the leading geographies taking the flat of production and sales of passenger cars across the globe driven by leading OEMs, including Volkswagen, Ford, General Motors, Nissan, SIAC, and Maruti Suzuki. In 2023, some 65.3 million passenger cars were sold globally, up by about 11.3% Y-o-Y. At nearly 26.1 million units, China was the world's largest regional market for automobiles in 2023.

China, the largest vehicle market in the world, has been backed up by generous government support. China has a major presence of automotive manufacturers, which is likely to create an opportunity for automotive wiring harness manufacturers to enhance their manufacturing facilities across the country. This, in turn, is likely to witness major growth for the market during the forecast period. EU automobile sales in 2023 increased by 13.9% over 2022, totaling 10.5 million units. Every EU country registered growth in the year 2023, except Hungary (-3.4%). Key auto markets in Europe saw double-digit gains. Italy, Spain, and France noted annual growth of 18.9%, 16.7%, and 16.1%, respectively. In contrast to this, Germany has recorded a moderate growth of 7.3% due to weaker sales performance in December 2023.

India is one of the major automobile exporters, and strong export growth is expected in the future, seeing its present mobility expansion projects. Furthermore, multiple initiatives by the Government of India and major automakers in the Indian market are expected to boost the market’s growth. Despite several industry-specific headwinds like fuel and car price inflation, a hardening interest rate, and unfavorable foreign exchange movements, the easing supply chain shortages of 2021 and 2022 have led to the highest-ever passenger vehicle sales in 2023.

According to the Federation of Automobile Dealers Associations (FADA), passenger vehicle (PV) retail sales reached an all-time high in FY24 with a total sale of 3,948,143 units, an increase of 8.45% higher than the 3,640,399 units in the financial year 2023 (FY23). It stated that increased vehicle availability, a strong model mix, and the introduction of new models contributed to the PV retail sales reaching a milestone year. Thus, the growing sales of passenger cars with increasing electronic features are driving demand for control switches in the passenger car segment.

Passenger car switches overall market (CY19-CY29)

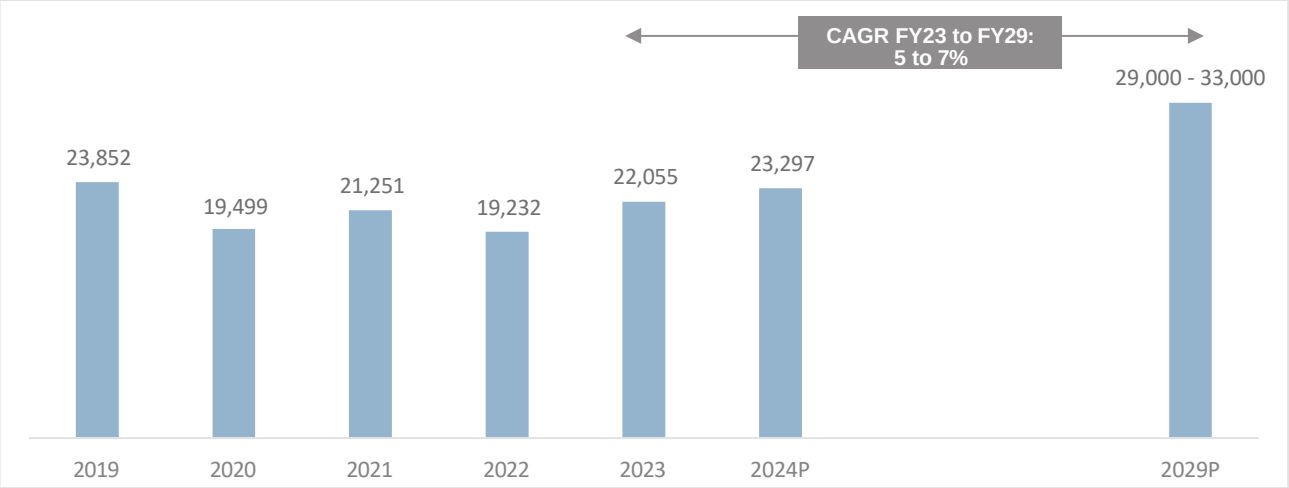
Passenger car switches market (value in USD Million)

The passenger car switches market is valued at USD 22,054.74 million in 2023. It is expected to reach USD 29,000 – 33,000 million by 2029, registering a CAGR of around 5-7% during the forecast period (2023 – 2029).

The European region was valued at USD 10,091.38 million in 2023. It is expected to reach USD 13,700 – 15,300 million by 2029, registering a CAGR of 5.2 to 7.2% during the forecast period (2023 – 2029).

The North American region was valued at USD 10,047.70 million in 2023. It is expected to reach USD 13,500 – 15,000 million by 2029, registering a CAGR of 5 to 7% during the forecast period (2023 – 2029). The passenger car switches market in North America is experiencing substantial growth, driven by several interlinked factors. In 2022,

passenger car sales in North America reached 6.5 million units, and this figure rose by 6.1% to 6.9 million units in 2023. This increase in vehicle sales is a primary driver of the expanding market for passenger car switches, as the demand for advanced automotive electronics grows in parallel with vehicle sales.

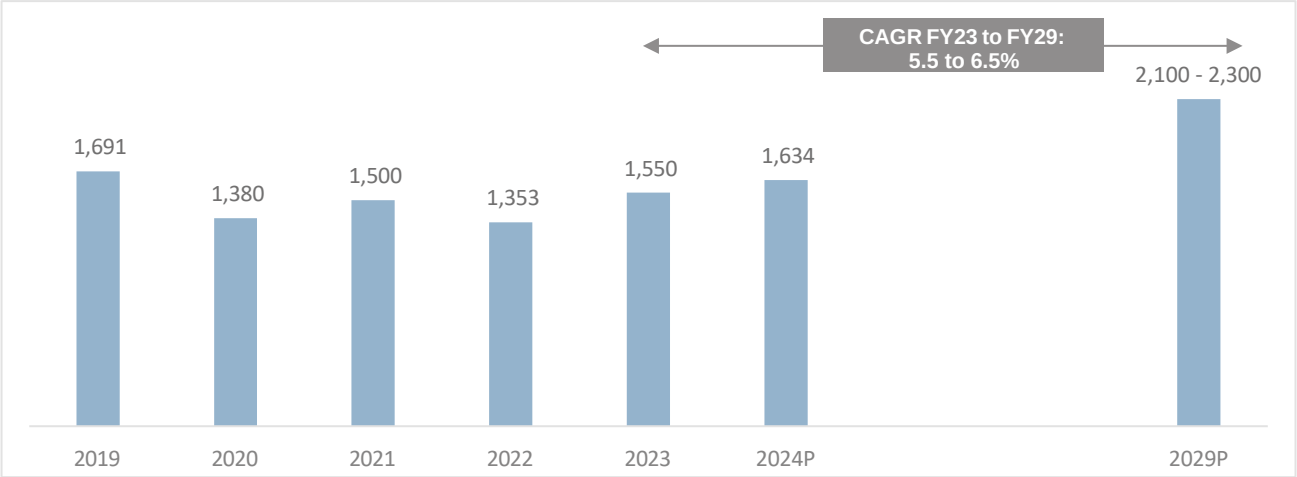


Note: Above figures comprise of sales for North America, South America and Europe
Values in USD Million
Source: Mordor Intelligence, CRISIL MI&A

In the dynamic automotive sector, the passenger car control switches market is pivotal, elevating the driving experience for consumers. These switches, integral to vehicles, empower drivers to manage functions like windows, lights, and turn signals. As technology advances and safety standards evolve, the market for these switches adapts, spurred by both innovation and changing consumer demands. The adoption of connected vehicles, advanced driver-assistance systems, in-car entertainment systems, GPS navigation, and connectivity features are becoming standard requirements in passenger cars worldwide. Further, introducing new safety technologies in vehicles, such as x-by-wire systems, blind spot detection, collision avoidance systems, lane-departure warnings, and adaptive cruise control, are increasing the usage of electronic equipment and systems. Switches are required to regulate such system functions.

The passenger car control switches market under the switch segment includes push-button, toggle, rocker, rotary, and other variants. Knobs and buttons, as physical controls, provide a tactile and familiar interface, ensuring consistency and bolstering consumer appeal. Key priorities for manufacturers in this sector include durability, user-friendliness, aesthetics, and cost-effectiveness in their passenger car control switch designs.

Passenger car switches market (volume in Million units)



Note: Above figures comprise of sales for North America, South America and Europe
Volumes in Millions
Source: Mordor Intelligence, CRISIL MI&A

Switches are poised to overtake knobs and touchscreens in the long run. The prevalent use of touchscreens and buttons in vehicles, while modern, raises concerns about their reliability and durability across various driving conditions. Unlike traditional switches, touchscreens are vulnerable to damage from dust, moisture, and other environmental elements. Manufacturers tackle these challenges by innovating resilient touchscreen technologies capable of enduring daily vehicle use. This transition presents a significant opportunity for switch manufacturers in the foreseeable future.

Passenger car switches market by Geography

North America

The North American region was valued at USD 10,047.70 million in 2023. It is expected to reach USD 13,500 – 15,000 million by 2029, registering a CAGR of 5 to 7% during the forecast period (2023 – 2029). The passenger car switches market in North America is experiencing substantial growth, driven by several interlinked factors. In 2022, passenger car sales in North America reached 6.5 million units, and this figure rose by 6.1% to 6.9 million units in 2023. This increase in vehicle sales is a primary driver of the expanding market for passenger car switches, as the demand for advanced automotive electronics grows in parallel with vehicle sales.

Technological advancements play a crucial role in this market's growth. The automotive industry is witnessing rapid innovations, particularly in electronic systems and smart technologies. Modern passenger cars are increasingly equipped with advanced features that rely on sophisticated switch systems. This includes touch-sensitive controls, multi-functional steering wheel switches, and integrated driver assistance systems, all of which require high-quality, reliable switches.

The trend toward electric vehicles (EVs) and hybrid vehicles in North America is significantly influencing the passenger car switches market. EVs and hybrids typically feature more complex electrical and electronic systems compared to traditional internal combustion engine vehicles. This complexity requires a greater number and variety of switches to manage functions such as battery management, regenerative braking, and infotainment systems.

South America

The South American region was valued at USD 1,915.82 million in 2023. It is expected to reach USD 2,400 – 2,700 million by 2029, registering a CAGR of 4 to 6 % during the forecast period (2023 – 2029).

The passenger car switch market in South America, particularly in Brazil, is witnessing significant growth driven by robust vehicle production and the increasing demand for advanced automotive technologies. In 2023, vehicle production in Brazil surged to approximately 2.3 million units, highlighting the country's strong automotive manufacturing base and the consequent demand for essential components like switches. This production boom is complemented by a rising consumer preference for vehicles equipped with sophisticated features, such as electric vehicles (EVs) and advanced driver-assistance systems (ADAS), which rely heavily on intricate switch systems for their functionality and safety protocols.

In 2022, passenger car sales in Central and South America totaled 2.4 million units, highlighting the region's strong automotive market. This figure increased by 1% to 2.97 million units, indicating a steady recovery and expansion following the pandemic. This growth in car sales is pivotal for the South American passenger car switch market as it signifies the rising demand for vehicles equipped with advanced electronic systems.

The Brazilian government's proactive stance in supporting the automotive sector further enhances the passenger car switches market outlook.

For instance, In December 2023, a subsidy program was introduced to incentivize electric vehicle production. A targeted 20% increase in EV output was expected over the next two years. This initiative boosted the adoption of EVs and increased the demand for specialized switches tailored for electric vehicle applications.

Environmental regulations implemented in March 2024 mandated the integration of recyclable and eco-friendly materials in automotive components. These regulations underscored a growing emphasis on sustainability in automotive manufacturing, influencing the design and production of switches that meet stringent environmental standards while maintaining high performance.

According to the National Association of Motor Vehicle Manufacturers (ANFAVEA), Brazil's vehicle production saw a notable 11.6% increase in 2023 compared to the previous year. This surge in production was directly correlated with the demand for automotive components, closely intertwined with the passenger car switch market.

As vehicle production expands, the requirement for reliable and technologically advanced switches that can manage the intricate electronic systems in modern vehicles will also rise, driving the market's growth.

Europe

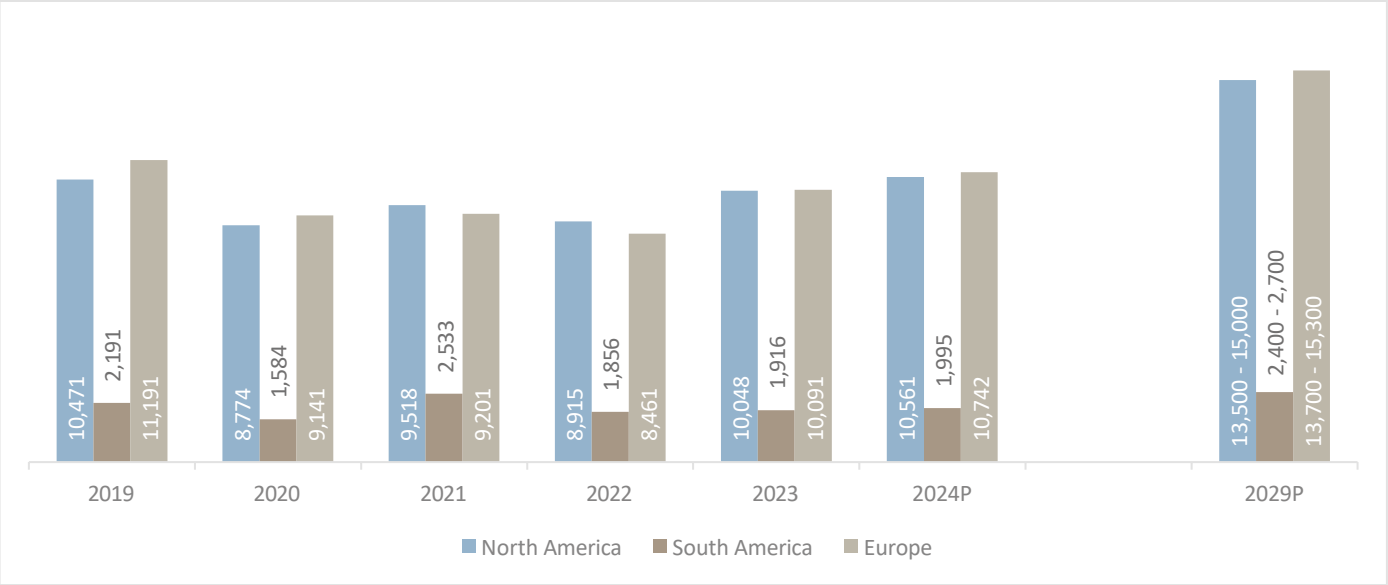
The European region was valued at USD 10,091.38 million in 2023. It is expected to reach USD 13,700 – 15,300 million by 2029, registering a CAGR of 5.2 to 7.2% during the forecast period (2023 – 2029).

The European passenger car switch market is navigating a pivotal phase driven by the automotive sector's shift towards sustainable mobility practices. This transition is accompanied by challenges such as technological innovation, regulatory compliance, and evolving consumer preferences. However, it also presents substantial opportunities for market expansion and environmental advancement.

In 2022, European passenger car sales totaled 12.6 million units, indicating a resilient automotive market in the region. This figure surged by 18.7% to 14.9 million units in the following year, highlighting a robust recovery and growth trajectory post-pandemic. This upswing in car sales is pivotal for the European passenger car switch market as it signifies a heightened demand for vehicles equipped with advanced electronic systems. In December 2023, passenger car sales in the European Union decreased at a rate of 3.3% Y-o-Y.

Consulting

Passenger car switches market (value in USD Million)



Values in USD Million

Source: Mordor Intelligence, CRISIL MI&A

In the United States, major automotive switch manufacturers are focusing on enhancing their technological capabilities and expanding their manufacturing facilities. Companies are investing in automation technologies to improve production efficiency and reduce labor costs, responding to the increasing demand for electric and hybrid vehicles, which require more complex wiring systems. In January 2024, YURA Corporation's USD 35 million investment to expand its Torreon facility in Mexico, focusing on electric motors and battery components, directly impacted the North American switch market. This expansion increased the production capacity for electric vehicles (EVs) and hybrid cars, which require advanced switch systems for electronic controls. As demand grows for these vehicles in North America, the need for high-quality switches to support sophisticated electronic systems will rise accordingly.

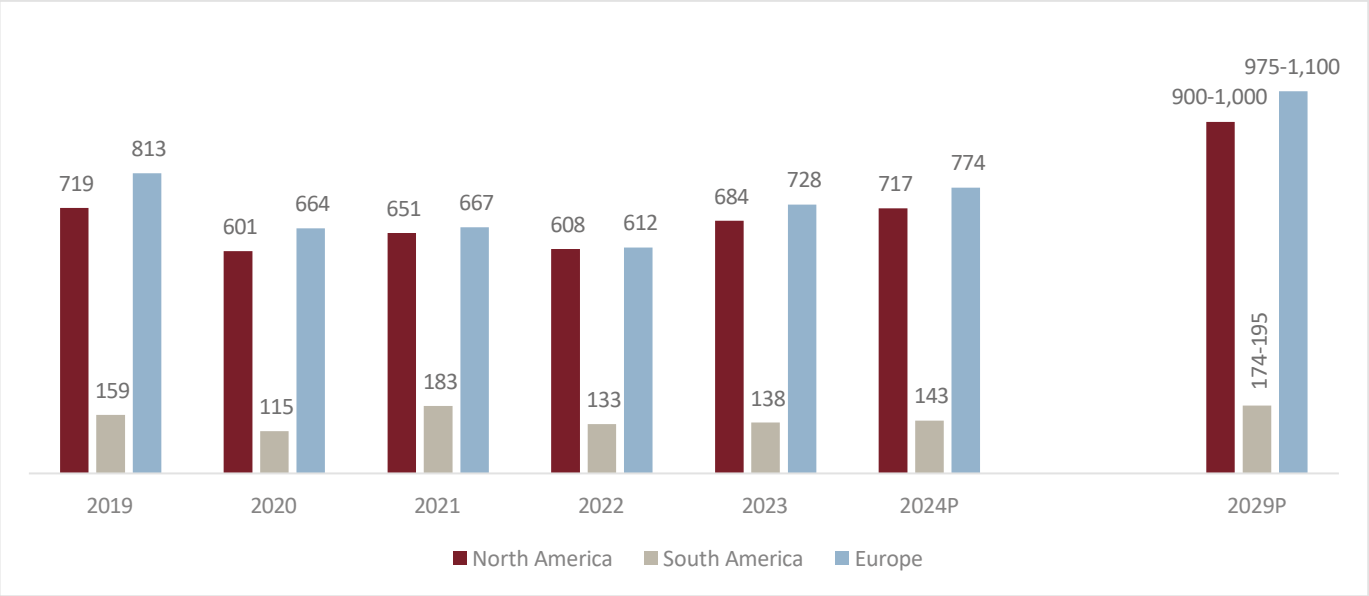
Italy's mandate for EV adoption in June 2023 is expected to be effective by 2025. It requires mild hybrid vehicles to achieve a minimum electric range of 55 miles on a single charge, illustrating a proactive step toward enhancing vehicle efficiency and reducing emissions. This regulation is expected to propel the adoption of mild hybrid technologies, particularly those utilizing battery types of 48V and higher. Consequently, Italy’s passenger car switch market is poised for significant growth as automakers integrate advanced electronic controls to meet these stringent requirements.

Across Europe, similar regulatory trends and consumer preferences shape the passenger car switch market. Automakers increasingly focus on developing vehicles with advanced features like electronic stability control, adaptive lighting systems, and comprehensive infotainment setups. These technologies rely heavily on reliable and efficient switch systems to ensure optimal performance and safety standards. The push toward electric and hybrid vehicles aligns with broader initiatives to achieve carbon neutrality and sustainable transportation solutions. This strategic alignment stimulates innovation within the automotive supply chain and opens avenues for switch manufacturers to collaborate with OEMs in developing next-generation electronic systems.

As vehicle manufacturing grows, the demand for dependable and technologically advanced switches capable of handling the complex electronic systems found in contemporary vehicles drives the growth of passenger car switches.

Consulting

Passenger car switches market (volume in Million units)



Volumes in Million units

Source: Mordor Intelligence, CRISIL MI&A

Passenger car switches market by Vehicle type

Normal

The normal segment was valued at USD 19,241.32 million in 2023 and is expected to reach USD 25,500 – 28,500 million in 2029, registering a CAGR of 4.8 to 6.8% during the forecast period (2023-2029).

The normal passenger car switch market, encompassing vehicles priced between EUR 10,000 and EUR 40,000, represents a significant and dynamic segment of the global automotive industry. One of the primary drivers of growth in this market is the accelerating shift towards electric vehicles. Government regulations aimed at reducing emissions, coupled with financial incentives for EV adoption, are boosting demand for advanced electronic switches. In addition, technological advancements such as advanced driver assistance systems (ADAS), infotainment systems, and smart climate control are driving the need for more sophisticated switch systems. Consumers in this segment are increasingly seeking vehicles equipped with features that enhance comfort and convenience, making advanced switch systems a key selling point.

The market is witnessing several notable trends, including the integration of smart technologies into switch systems. Touch-sensitive controls, haptic feedback, and connectivity with mobile devices are becoming standard features in the normal passenger car segment. Safety is another major focus, with manufacturers prioritizing the development of switches that enhance vehicle safety, such as advanced column switches for better control of lights and wipers and emergency warning blink switches. Sustainability is also gaining importance, with a growing trend toward using eco-friendly materials in the production of automotive switches.

Major semiconductor manufacturers are focusing on developing intelligent power switches tailored for automotive applications. These innovations aim to enhance vehicle safety, improve electrical system stability, and support the transition to more advanced electronic architectures in cars.

- In June 2024, STMicroelectronics began producing automotive high-side power switches with smart fusing and SPI. The VNF9Q20F combines MOSFET and STi2Fuse technology, enhancing boardnet voltage stability and preventing overheating. These switches are designed for zonal electrical/electronic architectures, fuse and relay replacement, and ECU isolation, meeting ISO 26262 safety standards.

Premium

The premium segment of the market was valued at USD 1933.25 million in 2023. It is expected to reach a value of USD 2,800 – 3,200 million by 2029, registering a CAGR of 6.50 to 8.50% during the forecast period (2023-2029).

The premium passenger car switch market, which includes vehicles priced between EUR 40,000 and EUR 90,000, is witnessing substantial growth and innovations. This segment is driven by the increasing integration of advanced driver assistance systems (ADAS) and autonomous driving features. Premium vehicles often serve as the testing ground for new technologies before they trickle down to other segments.

The demand for high-end infotainment systems, customizable climate control, and enhanced safety features necessitates the development of sophisticated switch systems. These switches need to be integrated with the seamless functionality, tactile feedback, and aesthetics of the luxurious interiors of such vehicles. A significant trend in this market segment is the adoption of haptic feedback and touch-sensitive switches. These switches embody a sleek and modern interface that aligns with the luxurious appearance of premium vehicles. There is a growing trend of integrating artificial intelligence (AI) and machine learning (ML) into vehicle control systems. This integration allows for personalized settings and predictive adjustments based on people's preferences and behaviors, thereby enhancing the overall driving experience.

Suppliers of automotive components are forming strategic partnerships to capitalize on the rising demand for electronic systems in vehicles. This trend indicates a shift toward more sophisticated and integrated electronic solutions in the automotive industry. For example:

- In April 2024, Remsons Industries and Daiichi Infotainment formed a joint venture to start a modern company in India. The new entity, known as Daiichi Remsons Electronics Private Limited, will manufacture and sell electronic goods to meet the requirements of the automotive sector. The product range offered by the new JV company includes switches, switchgear, and electrical panels, targeting the increasing demand for automotive electronics.
- BMW announced the rollout of its next-generation 'iDrive system' in its premium models, featuring advanced gesture control switches and voice-activated commands to significantly enhance users' interactions with the vehicle systems. Mercedes-Benz introduced a new line of premium SUVs equipped with a fully digital cockpit. Traditional switches have been replaced by touch-sensitive panels and customizable digital interfaces, thus setting a new standard for luxury and innovation.

The industry for premium passenger car switches is thriving, mainly driven by ADAS integration, haptic feedback, and AI-enhanced interfaces.

High-end

The high-end segment of the market was valued at USD 880.16 million in 2023. It is expected to reach a value of USD 1,200 – 1,300 million by 2029, registering a CAGR of 5 to 7% during the forecast period (2023-2029).

The high-end passenger car switches market, encompassing vehicles priced above EUR 90,000, represents the pinnacle of automotive luxury, performance, and cutting-edge technology. The high-end segment is characterized by bespoke models, superior materials, and the integration of the latest technological advancements. This market segment is a key area for innovation in automotive switch systems.

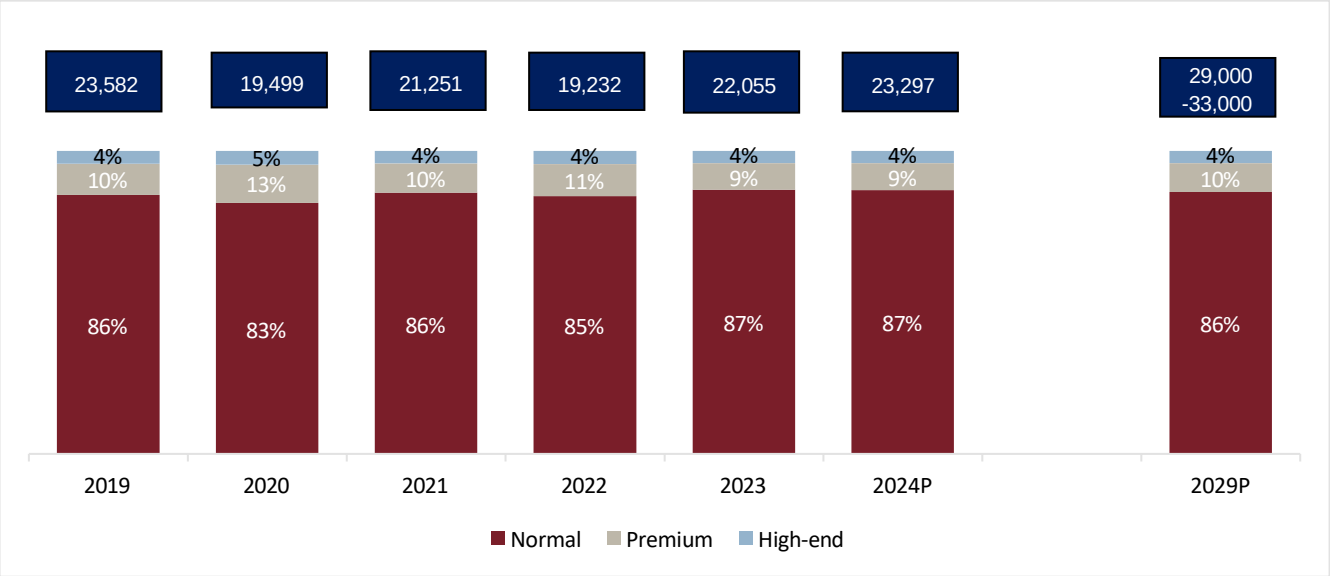
High-end vehicles often feature bespoke interior designs in which switches are tailored to match the unique aesthetics. This customization pattern includes the use of premium materials such as polished metals, exotic woods, and handcrafted finishes to ensure that every touchpoint exudes quality and refinement. Integrating the latest autonomous driving technologies and high-performance features requires sophisticated and reliable switch systems that can handle complex functionalities. The use of advanced and customizable control interfaces is a significant trend in this segment. High-end vehicles are increasingly equipped with fully digital and reconfigurable switchgear, allowing car owners to customize their vehicle control units to suit their personal preferences. The modern features come with configurable touchscreens, voice-activated controls, and gesture recognition systems that replace traditional switches, thereby providing a seamless and futuristic driving experience.

High-end vehicles often incorporate ambient lighting systems that interact with the switches, enhancing visual appeal and creating a luxurious cabin atmosphere. Rolls-Royce has introduced bespoke switch systems that can be personalized with precious materials and customized engravings to cater to the tastes of its exclusive clientele.

Bentley has developed advanced climate control switches that feature touch-sensitive panels and physical dials, blending modern technology with traditional craftsmanship. Ferrari is focused on integrating multifunctional switches that provide tactile feedback and are designed to perform flawlessly even under extreme high-performance or high-speed driving conditions.

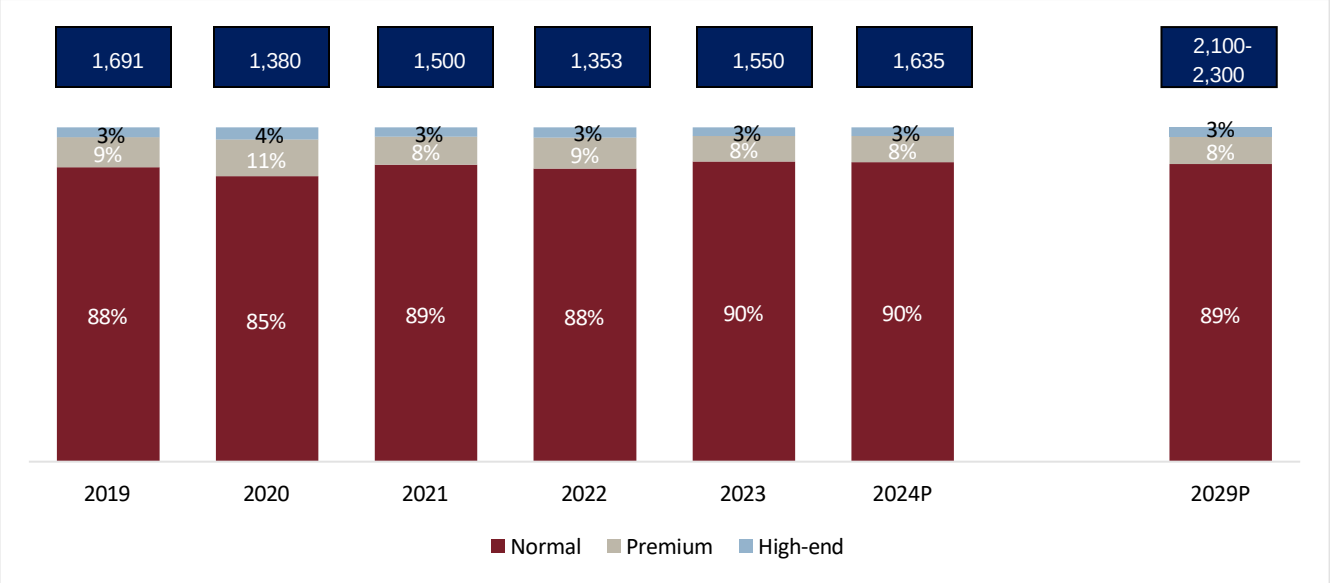
Fully digital interfaces, ambient lighting systems, and personalized controls enhance driving experiences. Brands like Rolls-Royce, Bentley, and Ferrari lead the market with innovative switch systems.

Passenger car switches market (value in USD Million)



Note: Above share comprise of sales value in USD Million for North America, South America and Europe
Source: Mordor Intelligence, CRISIL MI&A

Passenger car switches market (volume in million units)



Note: Above figures comprise of sales for North America, South America and Europe
Volumes in Millions
Source: Mordor Intelligence, CRISIL MI&A

Overall, the normal passenger car switch market is poised for significant growth, driven by electrification, technological advancements, and increasing consumer demand for comfort and convenience, offering substantial opportunities for further development and expansion.

Consulting

Passenger car switches market by Application type

The passenger car switches market by applications was valued at USD 23,852 million in 2023 and is expected to reach USD ~31,000 million in 2029, registering a CAGR of 5 to 7% during the forecast period (2023-2029). Charging control switch and Seat adjuster to register the highest CAGR growth of 19% and 13% respectively over the forecast period of 2023-2029.

The automotive industry is experiencing rapid technological advancement, resulting in the development of sophisticated vehicle control switches that enhance the driving experience and improve vehicle performance. Modern cars are a complex mix of electrical, mechanical, and digital systems that work together to provide a safe and comfortable driving experience. A critical component of this advanced system is automotive microswitches. These switches usually consist of a housing, a lever, and a spring-loaded contact. At a low actuation force, the lever compresses the spring and closes the contact, generating an electrical signal.

Electromechanical switches play a crucial role in modern vehicle control systems, allowing the driver to operate various functions such as lights, wipers, turn signals, and cruise control. These switches combine electrical contacts with mechanical actuators, providing reliable performance and durability in harsh automotive environments. With the increasing importance of vehicle connectivity and smart features, electromechanical switches are evolving to include advanced features such as touch sensors, backlighting, and integrated electronics.

On the other hand, micro switches, also called snap switches, are typically compact and highly responsive components used in car control switches to provide instant feedback and precise operation. These switches are ideal for applications that require fast switching operations, such as door locks, electric windows, and seat adjustments. Their small form factor and high reliability make them essential in automotive design and offer seamless integration into compact control panels and dashboard layouts. In recent years, the automotive industry has seen a shift toward electronic control switches based on digital technologies such as sensors, microcontrollers, and software algorithms. These electronic switches offer superior performance, flexibility, and programmability compared to traditional electromechanical switches.

One of the key market trends driving the adoption of electronic control switches in car interiors is the rise of human-machine interface (HMI) systems that prioritize user interaction and ergonomic design. HMI systems integrate touchscreens, capacitive buttons, voice recognition, and gesture controls to simplify the operation of vehicle functions and infotainment systems. Electronic control switches play a vital role in HMI systems by providing intuitive input devices that enable drivers and passengers to interact with the vehicle effortlessly and securely.

Switches considered for market sizing by Application type

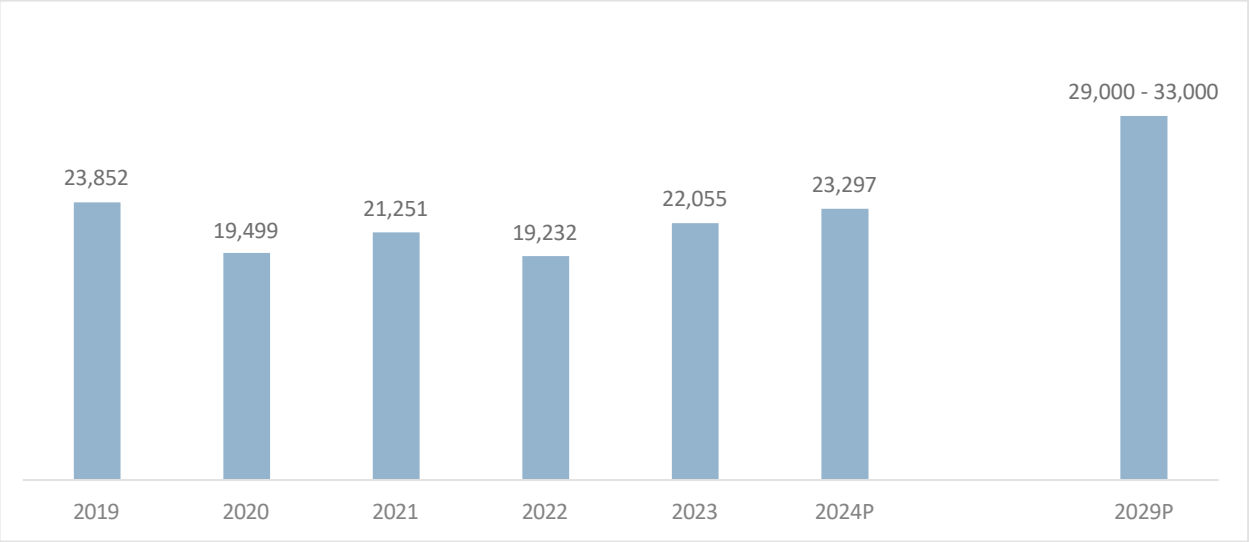
Product Name		
Column Switch	USB	Gear Shift Paddle
Warning Blink	Audio/Video	Boot Opening
Power Window	Steering Wheel front switch	Light Control Unit
Climate Control	Steering Wheel rear switch	Charging control Switch
Door Opening (door Locking Switch)	HVAC switch strip	Drive Mode
Glove Box	Head lamp front panel	Gear Shifter

Consulting

Roof Lamp	Internal trunk opener - dimmer	Seat Memory
Clutch Sensor	Drive Mode selector	Seat Adjuster
Electronic Park Brake Switch	Volume Knob	Roof Opening
COV	Electronic automatic brake	Passenger Air Bag deactivation

Source: Viney Corp

Passenger Car Switch Market (in USD million)



Note: Above figures comprise of sales for North America, South America and Europe
Value in USD Millions
Source: Mordor Intelligence, CRISIL MI&A

Steering Mounted Switches

Steering-mounted switches are integrated directly into the steering wheel, providing convenient control over various vehicle functions. These switches allow the driver to operate audio settings, cruise control, phone calls, and other features without taking their hands off the wheel. This design enhances driving safety by minimizing distractions and keeping the driver's focus on the road.

Customizable button layouts are becoming a key feature in steering-mounted switches to accommodate increasing vehicle connectivity features. Manufacturers are developing modular designs that allow for easy button placement and function reconfiguration. This flexibility enables automakers to tailor the steering wheel controls to different vehicle models or trim levels without significant redesigns. Some advanced systems incorporate small OLED displays on the buttons, allowing for dynamic labeling and function changes.

The integration of biometric authentication directly into the controls is a key trend in steering-mounted switches. This innovation allows personalized driver profiles and security features to be activated through fingerprint recognition on specific buttons. Manufacturers are developing durable, weather-resistant sensors that can seamlessly incorporate into the steering wheel without compromising its ergonomics or safety features. This technology enables instant driver identification, automatically adjusting seat positions, mirror angles, climate preferences, and infotainment settings.

Consulting

Moreover, steering-mounted switches stand to gain significantly from the rise of EVs, which frequently feature advanced driver-assistance systems (ADAS) and infotainment options that require easy and safe access. These switches are crucial for controlling various functions in EVs, from autonomous driving modes to enhanced infotainment and connectivity features. For instance, they can manage vehicle settings, adjust regenerative braking levels, or switch between different driving modes tailored to optimize energy efficiency.

Furthermore, with the integration of advanced telematics and navigation systems, steering-mounted switches provide a user-friendly interface for accessing real-time data and controls without distracting the driver. This makes them indispensable in the increasingly connected and automated EV ecosystem.

Climate Control

A climate control switch is a crucial component of a vehicle's HVAC system, allowing the driver and passengers to adjust the interior climate according to their comfort. A climate control switch is usually located on the dashboard or center console. It also includes controls for temperature, fan speed, airflow direction, and humidity levels.

Climate control systems vary from manual to advanced or automatic systems. Automated systems maintain a preset temperature without the requirement for constant adjustments. These systems not only enhance comfort in diverse weather conditions but also provide precise control over the cabin environment. In more advanced setups, dual-zone or tri-zone features enable distinct temperature settings for the driver, front passenger(s), and rear passengers.

With EVs focusing heavily on energy efficiency and passenger comfort, climate control systems are becoming more advanced and integral. The opportunity for climate control switches in EVs extends beyond regulating cabin temperatures. EVs often feature advanced thermal management systems that ensure optimal battery performance and longevity, which require precise and reliable climate control switches. These switches can be used to manage heating and cooling circuits for battery packs and power electronics, thus ensuring vehicle operations within optimal temperature ranges.

The European Union has set a goal to reduce CO2 emissions from new cars by 55% by 2030, compared to its 2021 levels. This falls under the bigger "Fit for 55" package aimed at achieving climate neutrality by 2050. Several European countries have announced their plans to phase out the sales of new internal combustion engine vehicles by 2030-2035. For example, Germany aims to roll out at least 15 million electric cars on the roads by 2030.

The integration of touch-sensitive surfaces is transforming climate control switches in modern vehicles. Manufacturers are moving away from traditional knobs and buttons and opting for sleek flat panels that respond to touch inputs. These systems often incorporate haptic feedback to simulate the feel of physical buttons, thereby enhancing users' experiences without sacrificing tactile response systems.

Advanced climate control switches are also being designed with proximity sensors, allowing them to illuminate or expand their interfaces when detecting human initiation. This technology allows for more intuitive temperature and airflow adjustments. However, the key challenge lies in ensuring that these touch-sensitive controls are easy to use without requiring too much visual attention from the driver.

Power window

A power window switch is a convenient feature that allows for the electrical operation of car windows. Power window switches are typically located on the driver's door panel and the individual doors for passengers. The driver's control panel often includes a master switch that can operate all the windows in the vehicle, thereby enhancing control and safety, particularly when traveling with children.

Consulting

The implementation of anti-pinch technology is revolutionizing power window switches in passenger cars. This safety feature uses sensors to detect obstructions and automatically reverse the window's movement to prevent injury. Manufacturers are now focusing on improving the sensitivity and reliability of these systems while reducing false triggers.

The integration of smart glass technology in EVs, which allows adjusting the tint and transparency levels via electronic controls, can be managed through enhanced power window switches. This technology expands the functionality and application of switches beyond conventional uses.

In the United States, the number of new electric car registrations reached 1.4 million units, representing an increase of more than 40% from the number recorded in 2022. This growth was driven by revised qualifications for the Clean Vehicle Tax Credit and price cuts for popular EV models like the Tesla Model Y, which witnessed a 50% increase in sales after becoming eligible for the full tax credit worth USD 7,500. The US government's commitment to support the EV market is reflected in the Inflation Reduction Act (IRA), which provides substantial incentives to electric vehicles and aims to boost the domestic production of EVs.

There is a growing trend of integrating power window controls with other door functions for more streamlined interior designs. Some advanced systems are incorporating gesture control or voice activation, allowing passengers to operate windows without physical contact. The challenge lies in balancing these high-tech features with cost-effectiveness and ease of maintenance.

The integration of smart glass technology is a notable trend in the passenger car power window segment. This advancement empowers power window switches to not just open and close the windows but also regulate the opacity of the glass, thereby negating the necessity for standalone sunshades. By using this technology, drivers and passengers can promptly tailor their window tints to bolster privacy, cut down on glare, and control the internal temperature.

Column Switch

Column switch is an integral part of a vehicle's steering column, serving as a multifunctional control unit. This switch typically includes controls for the turn signals, headlights, high beams, wipers, and sometimes even the cruise control application. By consolidating these functions into a single and easily accessible location, the column switch system enhances convenience and safety.

Drivers can activate the turn signals to indicate lane changes or turns without taking their hands off the steering wheel, ensuring better vehicle control. The inclusion of headlights and wiper controls further minimizes distractions, allowing the driver to focus on the road. Modern column switches also feature ergonomic designs and tactile feedback to improve usability and comfort.

The integration of multiple functions into a single ergonomic control unit is driving innovation in column switches. Manufacturers are focusing on creating sleek and intuitive designs that combine turn signals, headlights, and wiper controls into a compact module. This integration not only saves space but also enhances convenience and reduces cognitive load.

Advanced column switches now incorporate haptic feedback and adaptive lighting controls, allowing for seamless interaction between drivers and vehicle systems. However, challenges lie in balancing functionality with simplicity, ensuring that drivers can efficiently operate these multi-functional switches.

The integration of adaptive cruise control and lane-keeping assist functions directly into one module is a key trend in the development of column switches. This innovation allows drivers to operate advanced driver assistance systems without removing their hands from the steering wheel, thereby enhancing safety and convenience. Manufacturers are focusing on creating intuitive interfaces that seamlessly blend traditional column switch functions with new ADAS controls.

Consulting

Overall, the column switch segment of the market is expected to grow at a steady pace during the forecast period.

Charging control switch

The charging control switch segment is witnessing remarkable growth within the passenger car switch market, driven by the rapid adoption of electric vehicles (EVs), advancements in charging technology, and increasing consumer demand for efficient and reliable charging solutions.

The global shift towards sustainable transportation has significantly accelerated the adoption of electric vehicles. Governments worldwide are implementing stringent emissions regulations and offering incentives to promote EVs, leading to a surge in EV sales. As a result, the demand for charging infrastructure and related technologies, including charging control switches, is increasing exponentially.

Electric vehicles require sophisticated charging systems to manage the flow of electricity from the power source to the vehicle's battery. Charging control switches are integral to these systems, ensuring safe and efficient charging. They regulate the current and voltage, prevent overcharging, and protect the battery from damage. The growing number of EVs on the road directly translates to higher demand for advanced charging control switches.

Technological advancements in EV charging systems are a major factor driving the growth of the charging control switch segment. Innovations such as fast, wireless, and bidirectional charging transform how electric vehicles are powered. Each of these technologies requires specialized charging control switches to function effectively.

The integration of EV charging systems with the smart grid and renewable energy sources presents significant opportunities for the charging control switch market. As the energy landscape evolves, charging control switches will be vital in optimizing the interaction between EVs, the grid, and renewable energy systems.

As battery technology evolves, the requirements for charging control switches will also change. New battery chemistries and architectures will necessitate advanced switches capable of managing different charging profiles and optimizing battery performance.

The charging control switch segment in the passenger car switch market is poised for substantial growth, driven by the rapid adoption of electric vehicles, technological advancements in charging systems, and increasing consumer demand for efficient charging solutions.

Seat Adjuster

The seat adjuster switch segment in the passenger car switch market is experiencing notable growth, driven by advancements in automotive technology, increased demand for enhanced comfort among consumers, and innovations in design and materials.

Seat adjuster switches are typically used to control the position of the driver's seat and, in some models, the front passenger seat. They allow for adjustments in fore and aft positions and may include controls for lumbar support and height adjustments.

These switches are commonly found in vehicles equipped with power seats. They are connected to an electric motor under the seat that is powered by the car's electrical system. The ability to fine-tune seat positions is essential for driver comfort and ergonomics, which directly impact driving safety and fatigue levels on long journeys.

Different car manufacturers and models feature varying designs for seat adjuster switches. For instance, General Motors (GM) offers a specific front passenger side seat adjuster switch for certain models, such as the 2020 Chevrolet Tahoe. These design variations cater to each vehicle model's specific aesthetic and functional requirements, ensuring a seamless integration with the vehicle's interior.

Consulting

Seat adjuster switches now often come with LED indicator lights, providing visual feedback on the seat's position and adjustment status. This feature significantly enhances user experience by making it easier to see and control seat adjustments, especially in low-light conditions. Including LED indicators represents a step towards more intuitive and user-friendly vehicle interfaces.

Manufacturers like Elektrosil offer custom-fit solutions for seat adjuster switches tailored to meet different car models' specific designs and functional requirements. These solutions encompass various aspects, including housing construction, circuitry advice, and printed circuit board design.

As power seats become more common in a wider range of vehicle models, the demand for reliable and high-quality seat adjuster switches increases. This trend is not limited to luxury vehicles but is also seen in mid-range and entry-level cars.

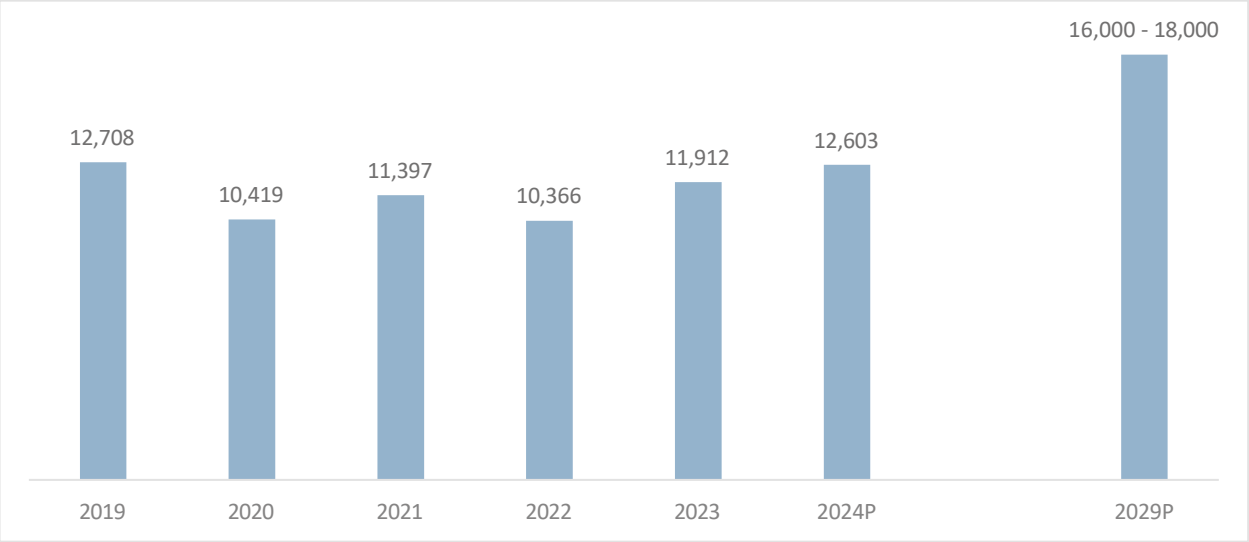
The seat adjuster switch segment is poised for continued growth, driven by ongoing technological advancements and increasing consumer demand for comfort and convenience. Integrating seat adjuster switches with other vehicle systems and developing more durable and user-friendly designs will further enhance their appeal.

Switches for market sizing by Application type (Manufactured by Vimercati SPA)

Product Name		
Drive Mode	USB	Gear Shift Paddle
Warning Blink	Audio/Video	Boot Opening
Seat Memory	Steering Wheel front switch	Light Control Unit
COV	Steering Wheel rear switch	Charging control Switch
Door Opening (door Locking Switch)	Volume Knob	Passenger Air Bag deactivation
Glove Box	Head lamp front panel	Drive Mode selector
Clutch Sensor	Internal trunk opener - dimmer	

Source: Viney Corp

Passenger Car Switch Market (in USD million)



Note: Above figures comprise of sales for North America, South America and Europe
Above figures are for applications manufactured by Vimercati SPA, acquired by Viney Corporation in 2011
Value in USD Millions
Source: Mordor Intelligence, CRISIL MI&A

As automakers continue to focus on vehicle electrification and sustainability, the demand for energy-efficient control switches is increasing. Electronic control switches provide energy-saving features such as sleep modes, power management algorithms, and low-power electronics to ensure optimal use of onboard resources and extend the battery life of electric and hybrid vehicles. Thus, promoting energy efficiency and sustainability, electronic control switches contribute to the overall environmental friendliness of modern automotive designs and are consistent with environmental regulations and consumer preferences. The increasing rate of urbanization, increasing per capita disposable income of consumers, and government regulation to improve new energy vehicles are making electric vehicles increasingly popular as more people around the world look for eco-friendly transportation options. This, in turn, is fueling the growth of the passenger car switches market.

- In April 2024, battery-electric car registrations rose by 14.8% to 108,552 units, with their market share steady at around 12%. France and Belgium saw significant increases of 45.2% and 41.6%, respectively, while Germany remained stable (-0.2%)
- In 2023, according to the International Energy Agency (IEA), global sales of electric vehicles increased by around 32.38% compared to 2022, surpassing 13 million for the first time, even though car sales were broadly soft last year.

In the competitive automotive control switch environment, innovation and differentiation are key factors driving the market's growth and customer loyalty. Automakers and suppliers invest in research and development to introduce cutting-edge technologies and materials that improve the performance, reliability, and aesthetics of vehicle control switches. From using advanced materials such as carbon fiber and aluminum for switch housings to integrating wireless connectivity and cloud-based services for remote access and diagnostics, the automotive industry is constantly pushing the boundaries of vehicle control switch design to deliver the next generation of intelligent and connected vehicles.

Vimercati SpA (Fully acquired by Viney Corp) is one of the few players in the global Mechatronics market. Overall Mechatronics Products market (North America, South America & Europe) is projected to grow by 6% CAGR over CY 2024-2029.

Consulting

Key player profiles in European Switch Industry

Vimercati SpA

Key facts	Brief profile
Year of incorporation: 1947 HQ: Pero - Italia	Founded in 1947 as Company for fine mechanical finishing, O.M.V. Srl (**Officine Meccaniche Vimercati**) starts from the early ’50s to enter the automotive market with the production of lamp-holders for **FIAT** dashboards. Between the ’80s and ’90s **VIMERCATI S.p.A.** acquired and consolidated the partnership with **PSA, BMW, GM** and **Renault**, keeping at the same time its presence in the domestic market with **FIAT**. In November 2011, the research for a corporate partner able to support the business growth through specific industrial synergies, led majority acquisition by the Indian Group **Viney Corporation Ltd** which later led to the complete Company takeover at beginning of 2015.

Location -

In Europe, the company operates through two production sites—Italy and Romania.

Key clients -

The company is a first-tier equipment manufacturer which supplies, both directly to OEMs and to Tier-1 system suppliers, as well as to respected, global automotive companies such as BMW Group (BMW, Rolls Royce, Mini), Volkswagen Group (Lamborghini), , Renault Group (Renault, Dacia), Stellantis Group (Alfa Romeo, Maserati, Ferrari PSA, Fiat), DAF etc.

Source: Company reports, CRISIL MI&A Consulting

Marquardt

Key facts	Brief profile
Year of incorporation: 1925 HQ: Rietheim-Weilheim, Germany	Family-run company, is one of world's leading manufacturers of electromechanical and electronic switches and switching systems. Automotive business unit develops operating components, vehicle access, driver authorization systems, ultra-wideband communication (UWB), and dynamic lighting systems. Mechatronic Devices business unit develops, manufactures and sells, among other things, switching systems for power tools, sensors, systems and switches for the home and for industrial and electrical applications
Location - Operates at a total of 22 locations in 14 countries on four continents **Key clients -** Products are used by customers in the automotive industry and include operating components, vehicle access, driver authorisation systems and battery management systems. Additionally, products are used in household appliances, industrial applications, as well as power tools	

Source: Company reports, CRISIL MI&A Consulting

Kostal

Key facts	Brief profile
Year of incorporation: 1912 HQ: Lüdenscheid, German	Independent family-owned company based in Germany which develops and manufactures technologically complex electronic and mechatronic products. Business divisions: Automotive Electrical Systems, Industrial Electronics, Connectors and Test Technology (SOMA) Automotive Electrical Systems is responsible for development, production and distribution of components, modules and systems for the electrical, electronic and mechatronic technology in car bodies. The Industrial Electronics division, develops innovative products for renewable energy generation and efficient energy use. Connectors operates all over the world to develop, manufacture and distribute innovative connector products for automotive and industrial applications. Test Technology (SOMA) develops, manufactures and distributes test and automation systems for specific industries and products

Location -

Presence through 46 locations in 21 countries across four continents

Key clients -

Largest automotive manufacturers with recent ones being BMW AG, Mercedes-Benz, Ford Motor, General Motors, Honda Motor, Hyundai, Tata Group, Tesla, Mazda Motor and others

Source: Company reports, CRISIL MI&A Consulting

Preh GmbH

Key facts	Brief profile
Year of incorporation: 1919	Subsidiary of Joyson Electronics Corp, Preh's development and manufacturing expertise includes, in particular, HMI systems for cars and commercial vehicles, as well as e-mobility components in the low-voltage and high-voltage range
HQ: Bad Neustadt an der Saale, Germany	Car HMI and Commercial Vehicle HMI divisions, offers operating systems in the interior of passenger cars and commercial vehicles. In addition, the Electromobility division develops and produces system solutions for electric and hybrid vehicles

Location -

Primarily located in European region, with additional locations being China and the USA

Key clients -

Leading car manufacturers are customers of Preh such as Audi, BMW, Ford, GM, Daimler Mercedes-Benz, Porsche, Rolls-Royce, Volkswagen, etc

Source: Company reports, CRISIL MI&A Consulting

10. Threats and Challenges

Demand Side Challenges

Economic Slowdown and Industrial Output Decline

Impact on Sales and Production: The Automotive Industry and within it the commercial vehicles Industry are very closely linked to the performance of the Economy. Economic slowdowns result in reduced industrial activities and lower consumer spending, directly affecting automotive segments such as two-wheelers, passenger vehicles and commercial vehicle sales. When the economy contracts, businesses often delay or reduce investments in new commercial vehicles, leading to a drop in orders for connective products and mechatronics. The downturn in FY2020 saw a drastic 17.8%, 18.1% and 28.8% decline in two-wheelers, passenger vehicles and commercial vehicle sales (SIAM) respectively, which translated to lower demand for wiring harness, connectors and switches. This contraction forced manufacturers to cut back on production, affecting their revenue streams and profitability.

Profit Margins and Cash Flow: With lower sales volumes, manufacturers face squeezed profit margins due to fixed operational costs and reduced economies of scale. This squeeze is in turn passed on to component manufacturers. Due to this, Cash flow issues can arise, impacting the ability to invest in new technologies or maintain existing equipment. Smaller players in the market may struggle to survive prolonged economic downturns.

We have projected real GDP growth to be 6.8% for fiscal 2025. Any moderation to GDP growth may have an impact on Industrial output and investment and consequentially on the Automotive and auto-component Industry.

Above or below normal monsoons

Within the Economic spectrum, the two-wheeler and commercial vehicle Industry is very closely linked to the output of the Agricultural and manufacturing sectors. While the Agricultural sector has a direct dependence on the normalcy of monsoon, the manufacturing sector too, is indirectly impacted by monsoon performance both on demand as well as supply side across various sub-segments on manufacturing.

We have considered a normal monsoon scenario while forecasting the outlook for the Automotive Industry. If rains are not normal and there is a scenario like El Nino or La Nina impacting farm activities on the rural side, then that could impact farm related incomes as well as sentiments which in turn can affect the demand side factors for two-wheelers and commercial vehicles and in turn for auto component suppliers.

Impact of changing interest rates scenario

A sustained high level of inflation could lead to rate hikes by the central bank thereby impacting interest rates. The transmission of past rate hikes by the Monetary Policy Committee (MPC) have largely played out amid tight liquidity conditions. There could be further rise in market lending rates in the near term on account of many other macroeconomic conditions thereby leading to an increase in lending rates impacting cost of purchase.

Increase in vehicle cost of ownership

A vehicle's cost of ownership is determined by its cost of acquisition and cost of operations, and both have a significant impact on the demand. The cost of vehicle acquisition rises when OEMs transfer the impact of increased manufacturing costs to the customers. In the past, the industry has seen price hikes owing to several reasons like emission norms implementation, increase in raw material prices and general inflationary hikes. These are also likely to push vehicle prices upwards going forward. Auto finance rates are also pivotal in determining affordability.

The cost of operations for a customer are directly impacted by fluctuations in crude oil prices and INR USD exchange rates, that cause rise in fuel import costs and overall fuel prices. Geopolitical issues like the Russia-Ukraine war, the war in Israel etc. could also impact fuel prices thereby having a bearing on the vehicle demand and in turn for the harness and connectors manufacturers

Price escalations on account of regulatory push

Based on European emission standards, the Indian government has introduced the Bharat Stage (BS) norms, which are being implemented in a phased manner in the country. For the BS-VI stage 2 norms, applicable from fiscal 2024, companies have invested in the relevant technology, research, and development, and signed joint ventures (JVs) with global players. These norms have resulted in price hike for vehicles across segments owing to the introduction of new technologies to meet new emission regulations. Going forward, new emission norms are likely to be announced, which could potentially raise vehicle prices as well and impact the demand.

Inherent cyclicity of the domestic 2W and PV business

The two-wheeler and passenger vehicle industry has close linkages with growth in GDP as well as business cycles impacting incomes of probable customers thereby making the industry susceptible/vulnerable to these changes. This cyclical nature of the two-wheeler and passenger vehicle industry poses constant challenges to the industry players and component suppliers as they have to constantly manage inventory optimally and profitably.

Inherent cyclicity of Commercial vehicle dependent Industries

The demand for commercial vehicles is closely tied to economic growth. During periods of robust economic expansion, there is an increase in industrial output, infrastructure projects, and logistics activities, driving higher demand for commercial vehicles. Conversely, during economic slowdowns, demand plummets as businesses reduce capital expenditures and transportation needs decline. For instance, the CV industry has seen 3 business cycles in the past 2 decades:

- FY04 to FY09 (peak in FY08)
- FY 09 to FY15 (peak in FY12
- FY15 to FY 21 (peak in FY19)
- FY21 to ongoing

It has been seen that there can a swing of more than 20-25% between the peaks and throughs of the business cycles of the CV Industry which in turn can makes business planning complicated for players involved in supply of components to the commercial vehicle Industry.

Supply Side Challenges

Raw Material Availability and Cost

- Cost Management: Fluctuating prices of raw materials like metals and plastic pose significant challenges to managing costs. A sudden spike in prices, such as the increase in metal prices, can erode profit margins and make it difficult to offer competitive pricing to customers. Component manufacturers must either absorb these costs, reducing profitability, or pass them on to customers, potentially losing business to cheaper alternatives.
- Supply Chain Disruptions: Long lead time, chip shortage and geopolitical tensions can also lead to supply chain disruptions if suppliers are unable to secure consistent and affordable supplies. This inconsistency can result in production delays and missed deadlines, damaging relationships with OEMs and other key clients.

For instance, the outbreak of the COVID-19 pandemic disrupted the global supply chain for chips which led to production bottlenecks and delay.

Skilled Labor Shortage

Skilled labor is one of the most important supply side aspects in the manufacturing sector. Training and retaining skilled workers in areas such as electrical engineering, soldering, and assembly Industry is a key driving factor for success of any segment of the Industry including Automotive components.

Thus, inadequate availability of skilled labor can be one of the significant challenges impacting the automotive components Industry in India. This shortage can span across various facets, from production to maintenance and innovation, ultimately affecting the industry's growth and global competitiveness.

- Nature of the Shortage: The automotive components sector requires a workforce proficient in soldering, assembly and modern manufacturing technologies. The gap between demand and supply of such skilled labor is a monitorable for the success of the Industry going forward
- Educational and Training Gaps: The Indian education system and vocational training programs often lag in providing industry-relevant skills. Engineering graduates and technical diploma holders frequently lack hands-on experience with advanced machinery and technologies used in components segment
- Attrition and Retention Issues: Skilled workers tend to migrate to sectors offering better compensation and working conditions, such as IT or international opportunities. The high attrition rates further exacerbate the skill shortage within the industrial sector.
- Demographic and Geographic Disparities: There can be a geographical mismatch in the availability of skilled labor. Industrial hubs may struggle to attract talent from regions with a higher concentration of educational institutions due to relocation issues and urban-rural divide.

Technological Obsolescence

Technological obsolescence refers to the phase-out of technologies as newer, more efficient, and advanced technologies emerge. In India's manufacturing sector, technological obsolescence can be a potential challenge, affecting competitiveness, productivity, and innovation capacity.

Connective products and Mechatronics products Industry is constantly evolving, driven by technological advancements that enhance performance, functionality, and reliability. Furthermore, techniques such as High speed and Waterproof connectors, Miniaturization with manufacturers developing smaller and lighter components to meet the space constraints of modern devices and systems, advanced manufacturing techniques, such as additive manufacturing and automated assembly, to improve efficiency and product quality are enabling the development of more sophisticated and reliable products that meet the evolving needs of various industries. Without these technologies, smaller Indian component manufacturers may struggle to meet the product quality standards required by original equipment manufacturers (OEMs), particularly in export markets.

Policy and Regulatory Challenges

Changes in tax and duties regime

Changes in duties and tax structures present significant threats to the automotive components industry. These changes can have multifaceted impacts on cost structures, supply chains, and overall competitiveness.

This threat is particularly significant due to India's evolving tax landscape and the government's periodic adjustments to import duties and other taxes.

For instance, the initial phase of GST implementation saw significant disruption. Many businesses faced challenges adapting to the new tax structure, leading to temporary slowdowns in the manufacturing value chain.

Imposition or removal of tariffs can directly affect the cost of imported components and finished products, impacting both manufacturers and end-users.

Hence, changes in duty and tax structures across the automotive components value chain pose significant threats by increasing costs, complicating compliance, and creating market instability.

Environmental Regulations

Environmental regulations present a significant challenge for the Automotive components Industry in India, impacting manufacturing processes, costs, and compliance requirements. These regulations aim to mitigate environmental degradation and ensure sustainable industrial practices, but they also introduce complexities for manufacturers such as

Stringent Emission Standards: India has implemented several stringent emission standards that directly affect industrial operations. For instance, the Ministry of Environment, Forest and Climate Change (MoEF&CC) has established norms for emissions from industrial plants. Industries are required to adhere to standards for pollutants such as particulate matter, sulfur dioxide, and nitrogen oxides. Failure to comply with these regulations can result in heavy fines and even plant shutdowns. Central and State pollution control boards are generally the nodal agencies/enforcement agencies for compliance of the said norms.

Waste Management and Resource Utilization: Industries are also required to manage their waste effectively. The Hazardous Waste Management Rules mandate that industries properly handle, treat, and dispose of hazardous waste. This includes waste generated during the manufacturing of connectors, switches and wiring harness, which may contain lubricants and other harmful substances.

Safety standards: Safety standards, such as UL and IEC regulations, are essential to ensure the safety and reliability of electrical components. Compliance with these standards can be challenging and costly for manufacturers.

Adhoc changes in policies

A challenge that the industry is facing is frequent changes in policies which makes it difficult for auto industry stakeholders not only to ensure adherence but also commit investments. Overall policy stability and transparency will be required going forward to ensure smooth technology transition and localization in the country.

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