Market Intelligence
& Analytics

CRISIL
An S&P Global Company

Assessment of market potential for metal and associated components in automotive market

Metalman Auto Limited | **Aug 2024**

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Consulting

Contents

Note: Calendar Year (CY) for global chapters, Fiscal Year (FY) for Indian chapters

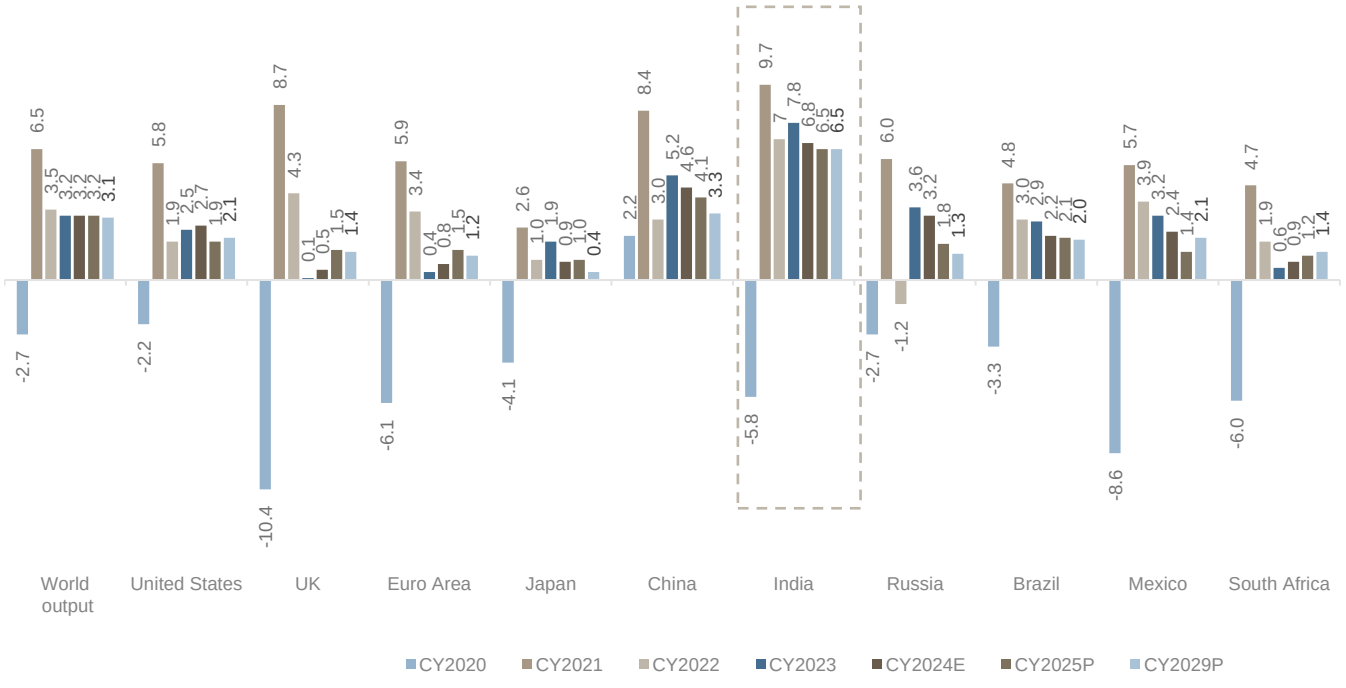
1. Macroeconomic overview of the global and Indian economy

Overview of the global economy

Review and outlook of global GDP

The global economy continues to recover from the challenges heaped by the COVID 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 [fuelled] 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 , 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 Ukraine 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.

Review and outlook of inflation in key economies

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.

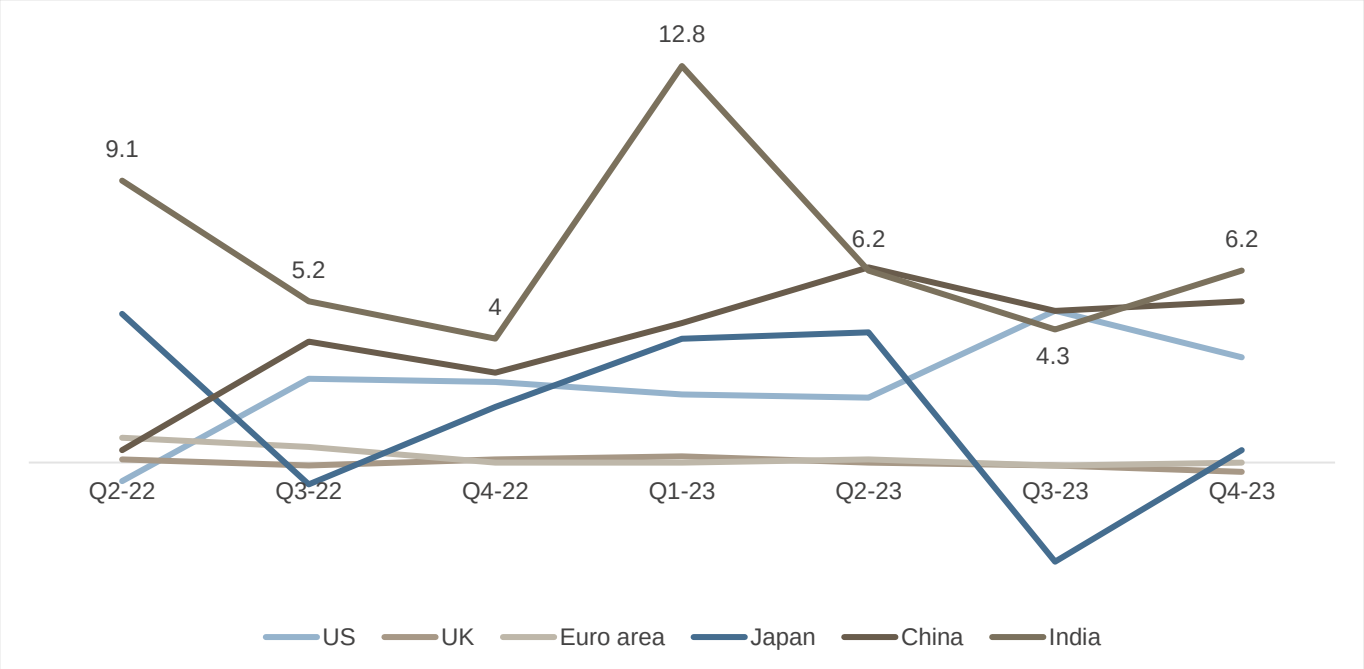
There is regional divergence on the inflation front in the [United States] the disinflation process remains uneven. S&P Global Ratings does not expect the Federal Reserve to cut rates before June. Inflation in the Euro zone eased further in March 2024 but remains above the European Central Bank's target. 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.

Consumer price inflation (year-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 area	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

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



Source: Statistical Bureau, respective countries

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.

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.

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%.

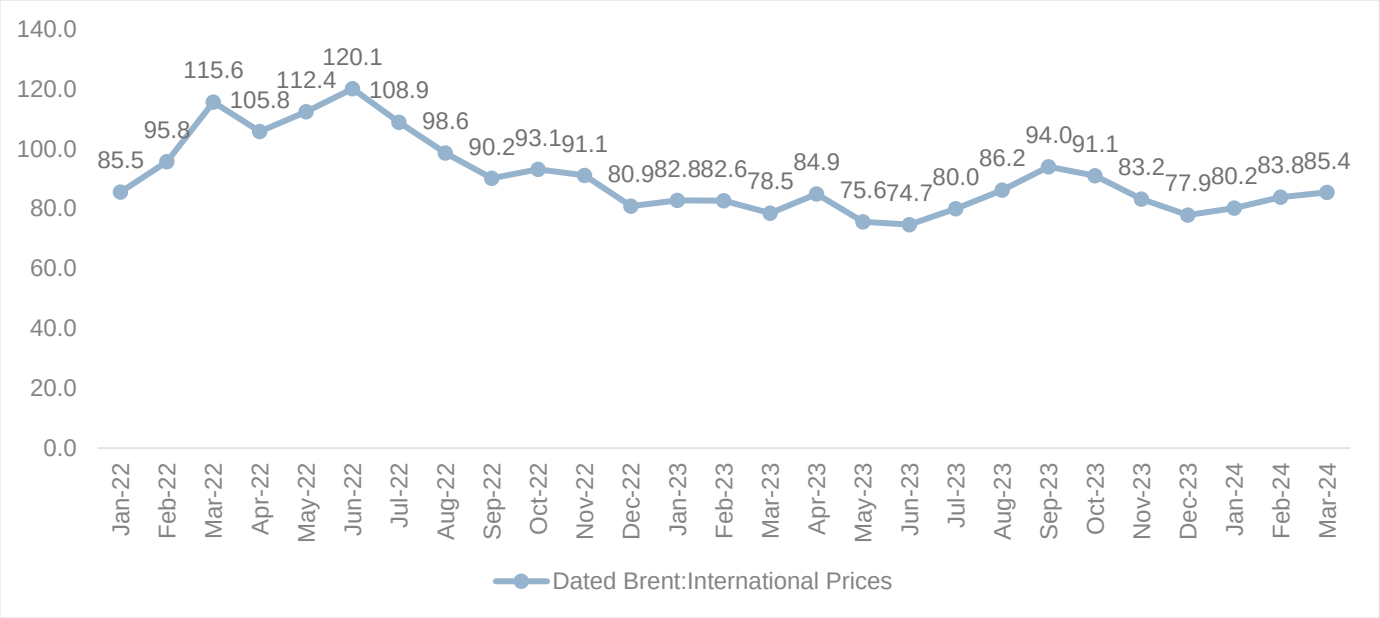
As per CRISIL MI&A, India's economy is expected to grow at 6.8% in fiscal 2025 up from 6.5% projected earlier. This will be driven by expected easing of domestic financial conditions, disinflation leading to increasing purchasing power of consumers and growth in private capital expenditure.

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 fuelled 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.

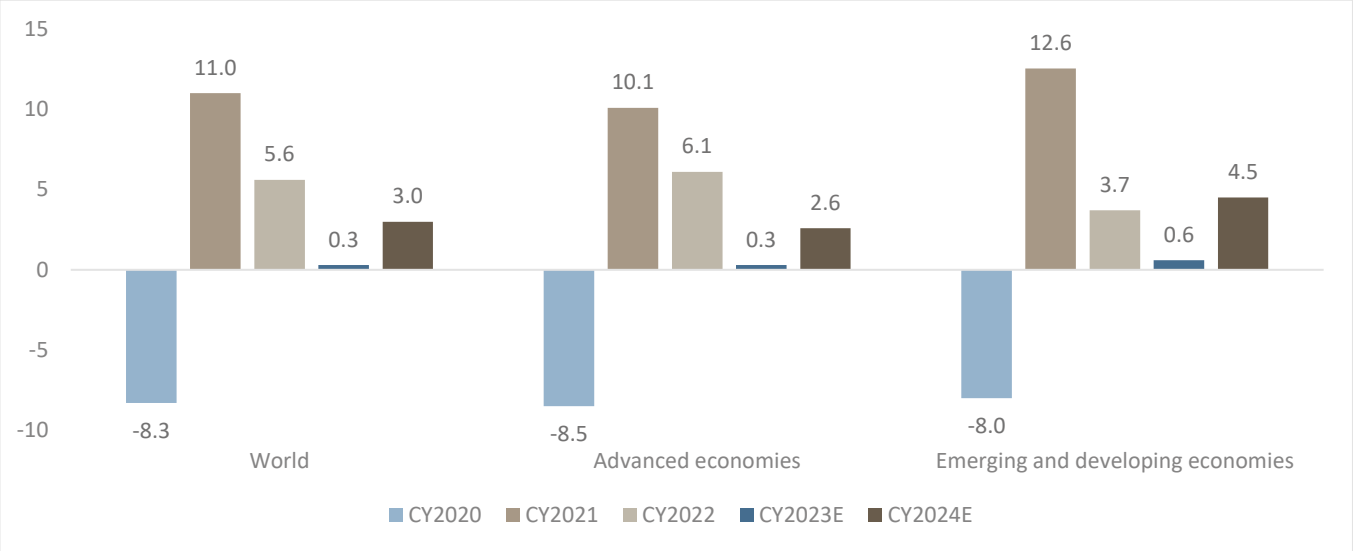
Global trade environment

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.

International Monetary Fund (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 El Nino phenomenon, may cause food prices to hike that may lead to food insecurity and put risk to global disinflation process.

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.

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.

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 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.

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 Indian government has introduced many reforms and incentive schemes to increase domestic manufacturing and attract global manufacturing firms to India.

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.

Trade deficit narrows

The global economy is set for broadly steady expansion in 2024, International Monetary Fund (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 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.

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.

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.

Overview of Indian Economy

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

India 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. 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 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%)

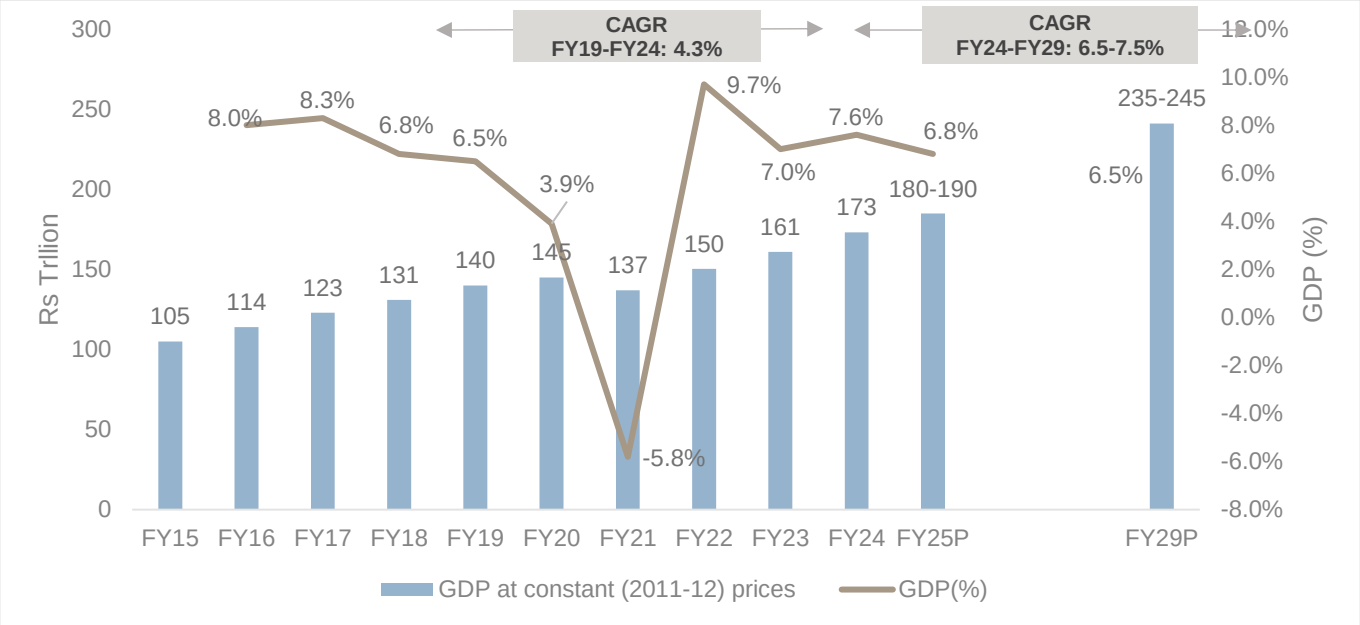
NSO now pegs GDP growth at 7.6% in fiscal 2024 compared with 7.3% as per the first advance estimates. Based on this second advance estimate, growth in the fourth quarter of this fiscal is estimated to slow to 5.9%. Additionally, the estimate for fiscal 2023 was revised to 7.0%, while for fiscal 2022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

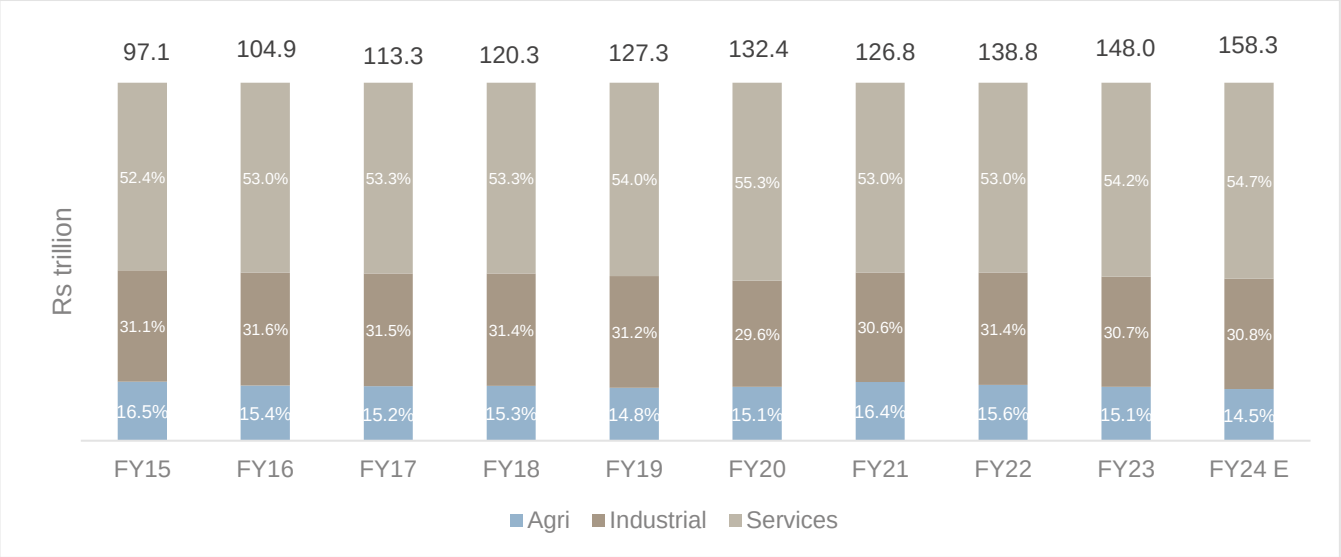
followed by industrial, which declined 0.9% on-year. Agriculture was the only sector that grew 4.1% on-year and restricted the fall in GDP.

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 and the European Union, and an escalation of the ongoing Red Sea tensions can act as drag on exports.

Risks to India's economic 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 International Monetary Fund (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 Economic Outlook – January 2024 update), CRISIL MI&A

Drivers for India's economic growth

Capital will continue to be the biggest contributor to growth. 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). 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.

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.

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

Near term review and outlook on inflation

Consumer price inflation (CPI) eased to 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 up to 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

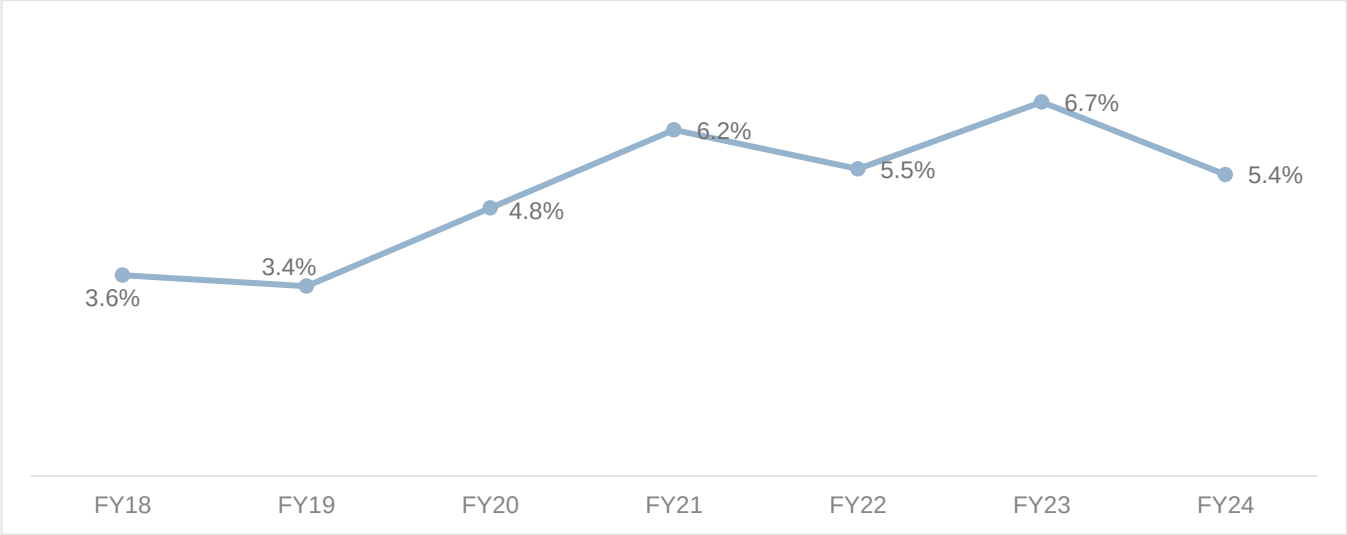
Wholesale Price Index (WPI)-linked inflation increased to 0.5% in March from 0.2% in February, mainly due to a rise in food inflation. Food inflation rose to 4.6% in March from 4.1% in February, driven by higher prices of cereals (9.0% vs 6.6%), which more than offset the decrease in pulse prices (17.2% 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 favourable 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

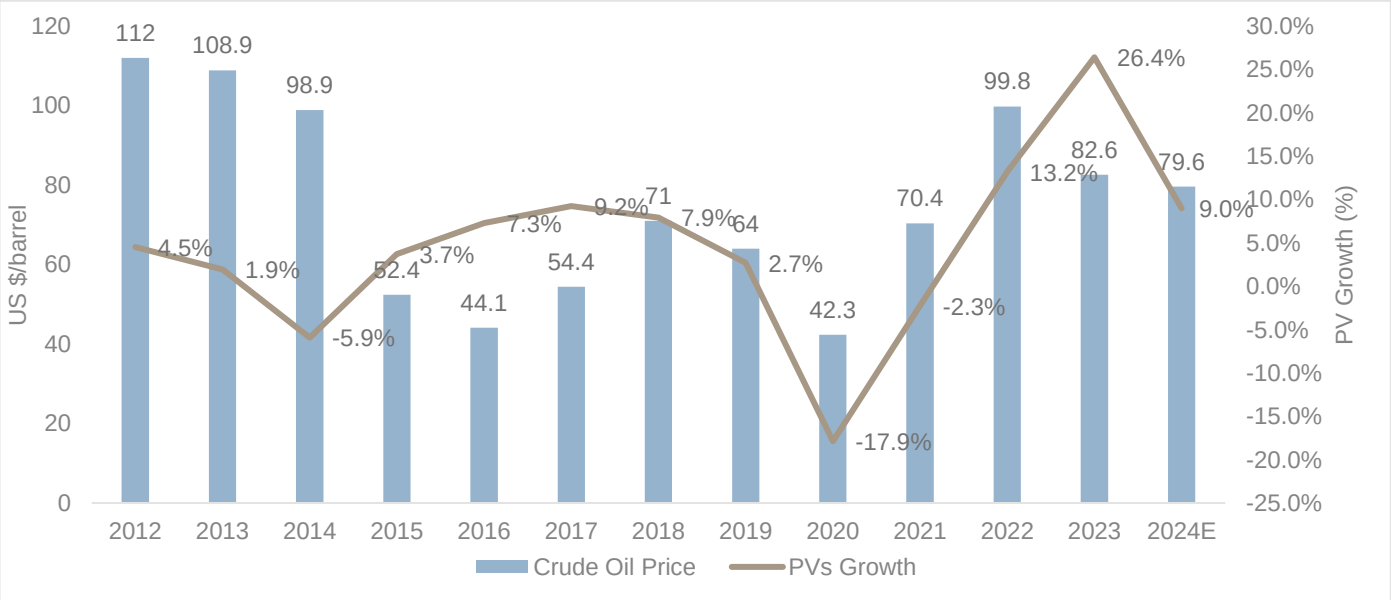
Fluctuations in crude oil prices and INR USD exchange rates directly affect the auto demand by raising fuel costs and import costs. Monsoon has a direct impact on the agriculture related factors like crop yields and food prices, which in turn impact auto demand by shaping consumer spending behaviours 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

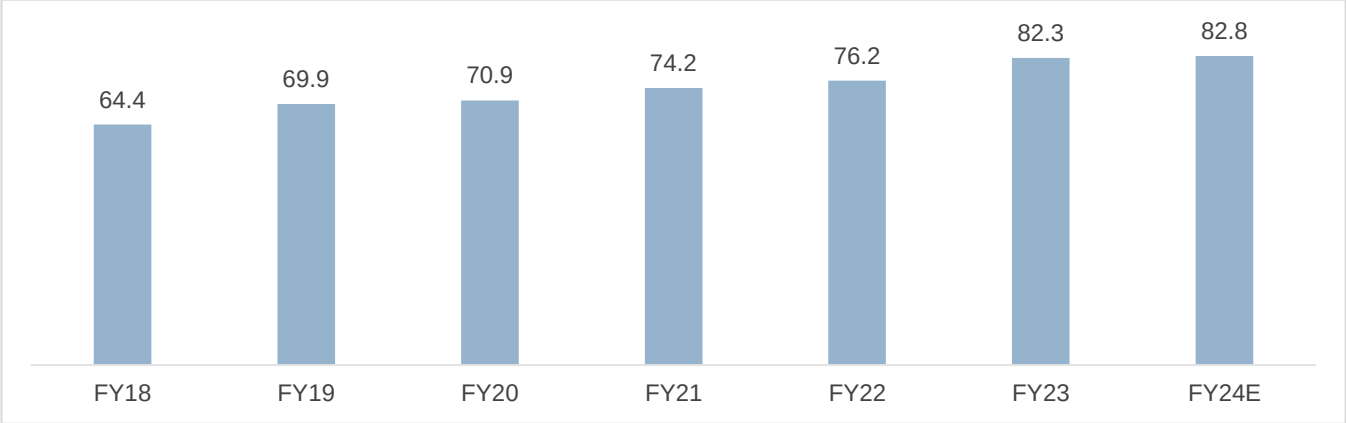
The rupee exchange appreciated slightly to 82.96/$ in February 2024 from 83.12/$ in January 2024. Strong capital inflows kept the rupee resilient in February, despite the dollar index gaining strength and a widening trade deficit. In fact, on a monthly average basis, the rupee appreciated 0.2% compared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



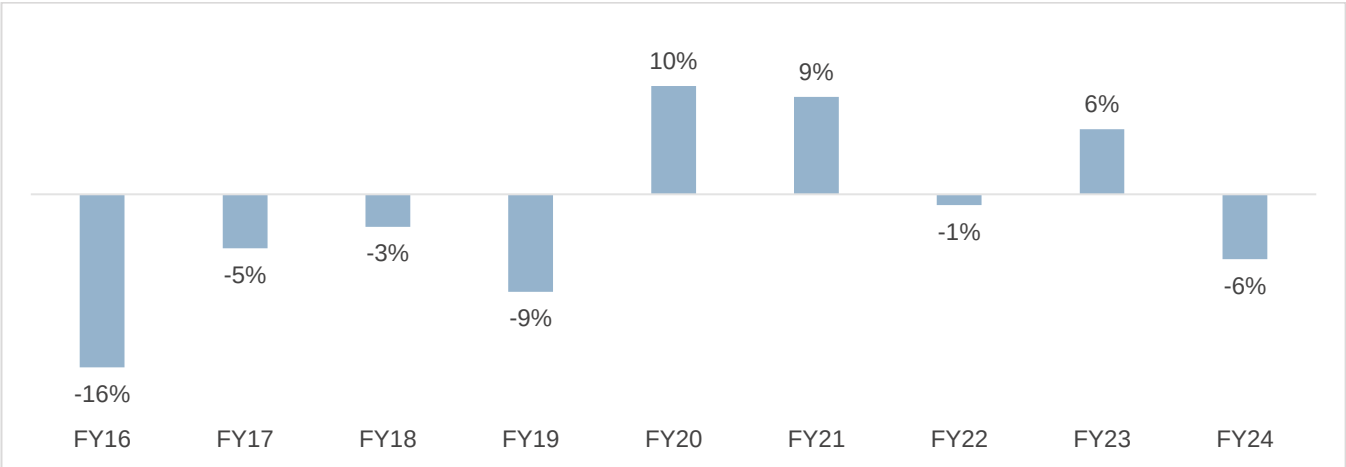
Source: RBI, CRISIL MI&A

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 favourable 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 favourable 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

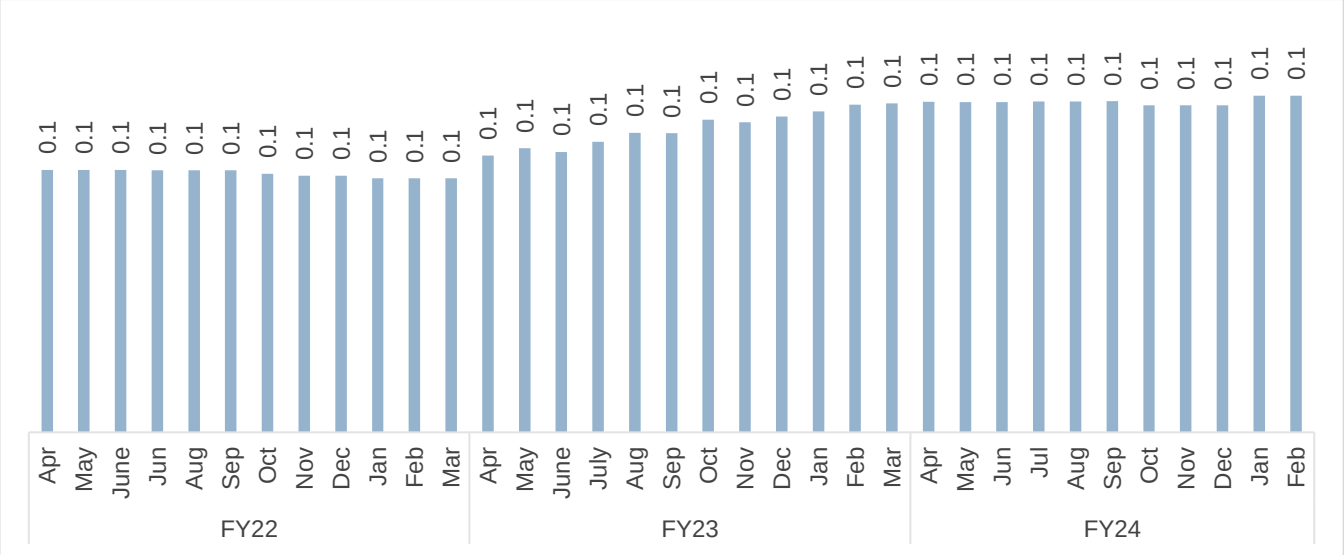


Source: IMD, CRISIL MI&A
Note: When the rainfall averaged over the country is within ±10% from its long period average (LPA) or 90% to 110% of LPA, the rainfall is said to be "normal". The LPA for the June to September period is 868.6mm.

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



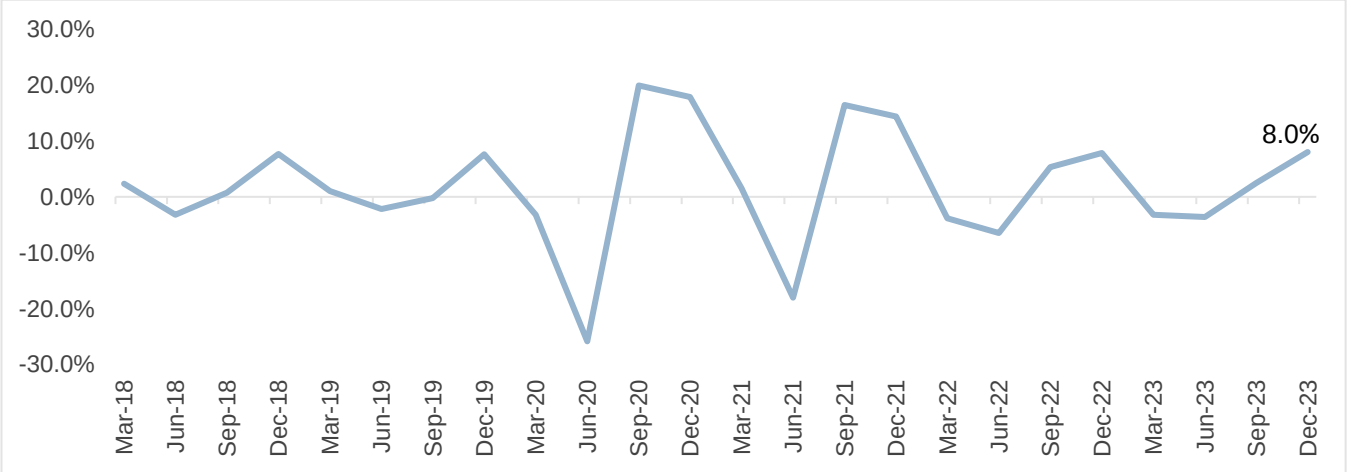
Source: Industry, CRISIL MI&A

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.

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 CY 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.

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 and) 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 and II)

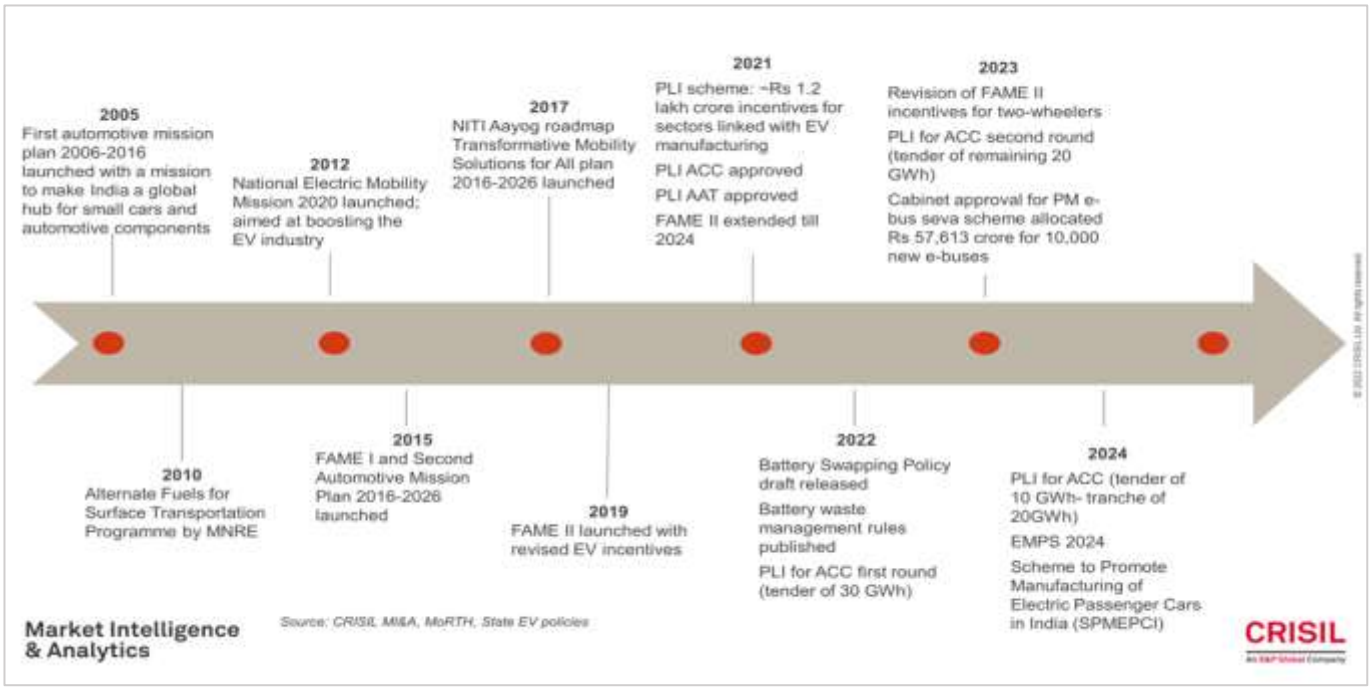
As part of the National Electric Mobility Mission Plan (NEMMP) 2020, the Department of Heavy Industry (DHI) formulated the FAME I policy in 2015 with a budget outlay of INR 895 crore. The FAME I policy was aimed at promoting EV ecosystem through technology development, demand creation, pilot project, 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 2W EV (including commercial and 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 and) 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 2W EV 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 2W EVand three-wheeler (e-3W). The scheme is aimed at providing incentives for the purchase of 2W EVs and e-3Ws in the country. The scheme would support the adoption of 372,215 EVs in total, including 333,387 2W EVs 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.

2W EVs 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 and 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.

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 and 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 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
	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%

Category of Car Model	GST Rate	Compensation Cess (%)
Passenger Vehicles popularly known as SUVs (above 4m in length, above >1500 cc engine and >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 and 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 transitions

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 of the global two-wheeler industry

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

Asia Pacific Region (APAC)

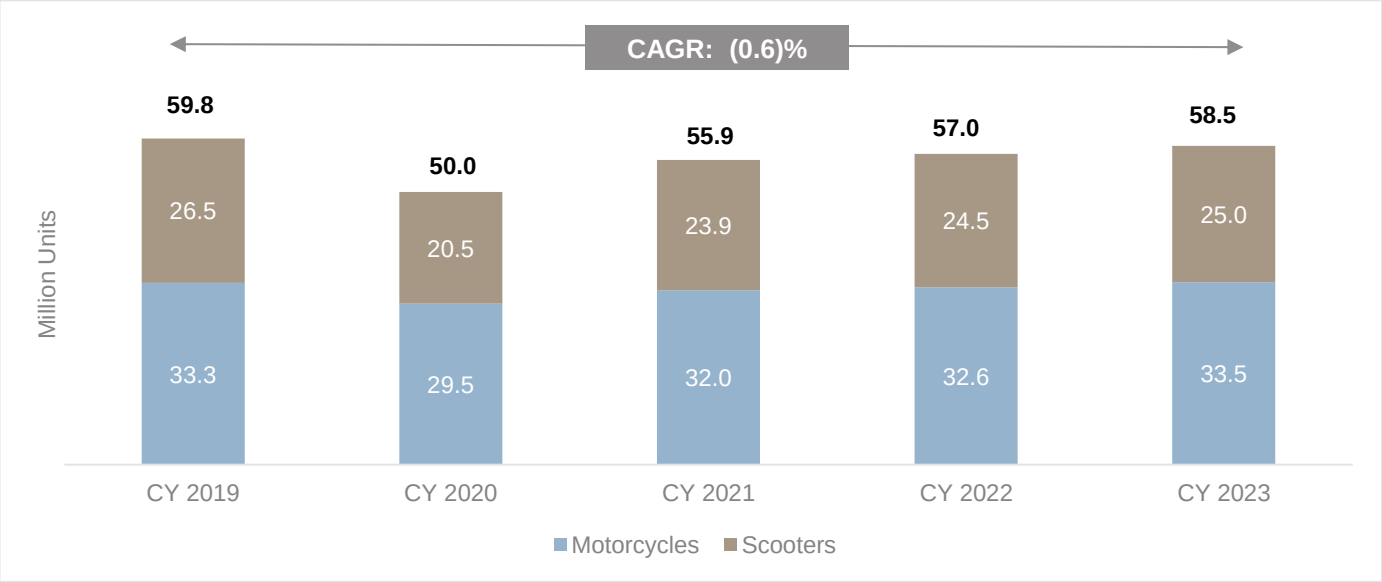
Asia Pacific Region dominates the world with respect to [.] the two-wheeler markets. The top two contributors to the global sales, India and China are part of the APAC region coupled with other large two-wheeler markets like ASEAN countries of Indonesia, Thailand, Vietnam, Philippines, Malaysia, Singapore,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

Within the APAC region, India is the largest contributor (30% share in [CY2023followed 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.

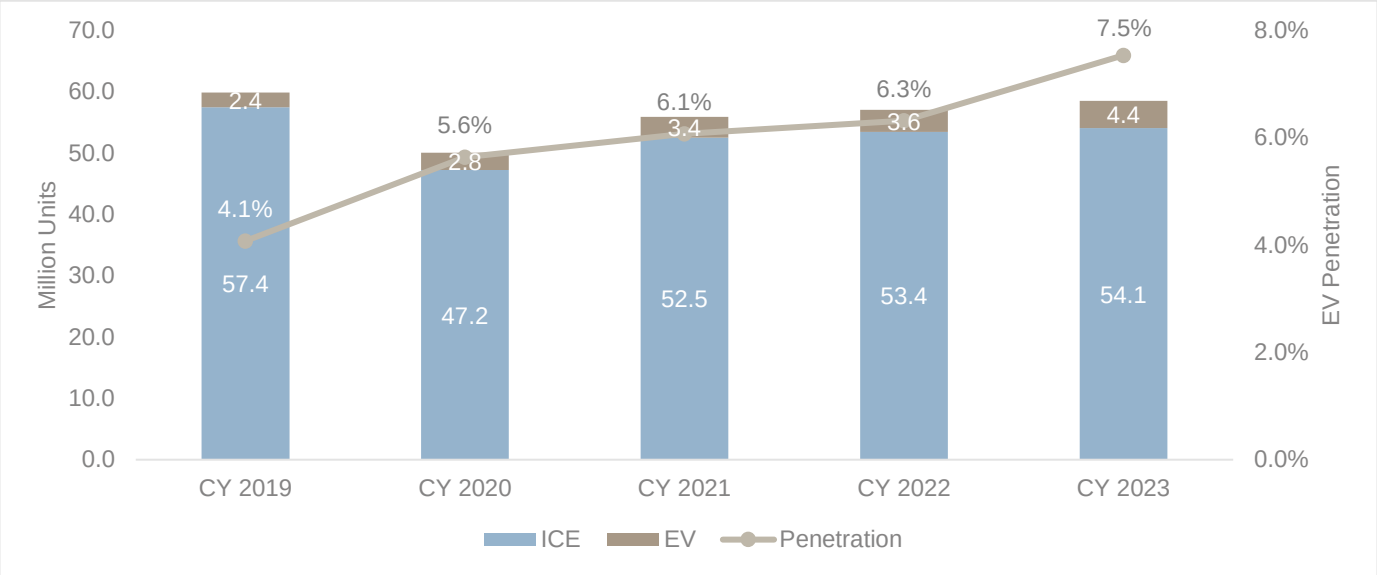
The pandemic (CY2020 and CY2021) impacted the macroeconomic environment globally. Additionally, there was reduced need of mobility amidst the lockdowns. Thus, [two-wheeler] sales witnessed contraction during that period. In the APAC region as well, sales contracted during the pandemic and increased at 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 [2W EV] provided the much-needed push to the industry sales.

APAC region two-wheeler sales volumes



Source: MORDOR Intelligence

APAC region two-wheeler sales powertrain split



Source: MORDOR Intelligence

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. Two-wheelers are the primary mode of transportation for a sizeable portion of customer base within the ASEAN region.

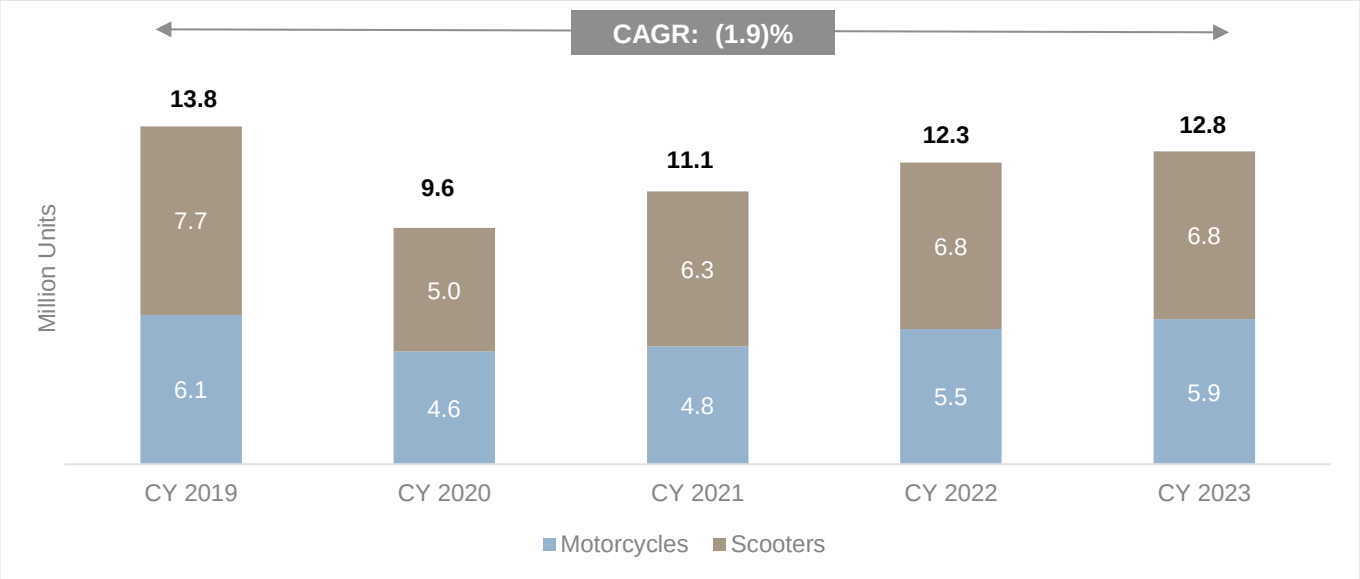
During CY2019-2023 period, two-wheeler sales in the ASEAN region contracted at 1.9% CAGR where major contributors within the ASEAN region, Indonesia (1% CAGR drop), Vietnam (6.2% CAGR drop), Philippines (2.3%

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 COVID 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

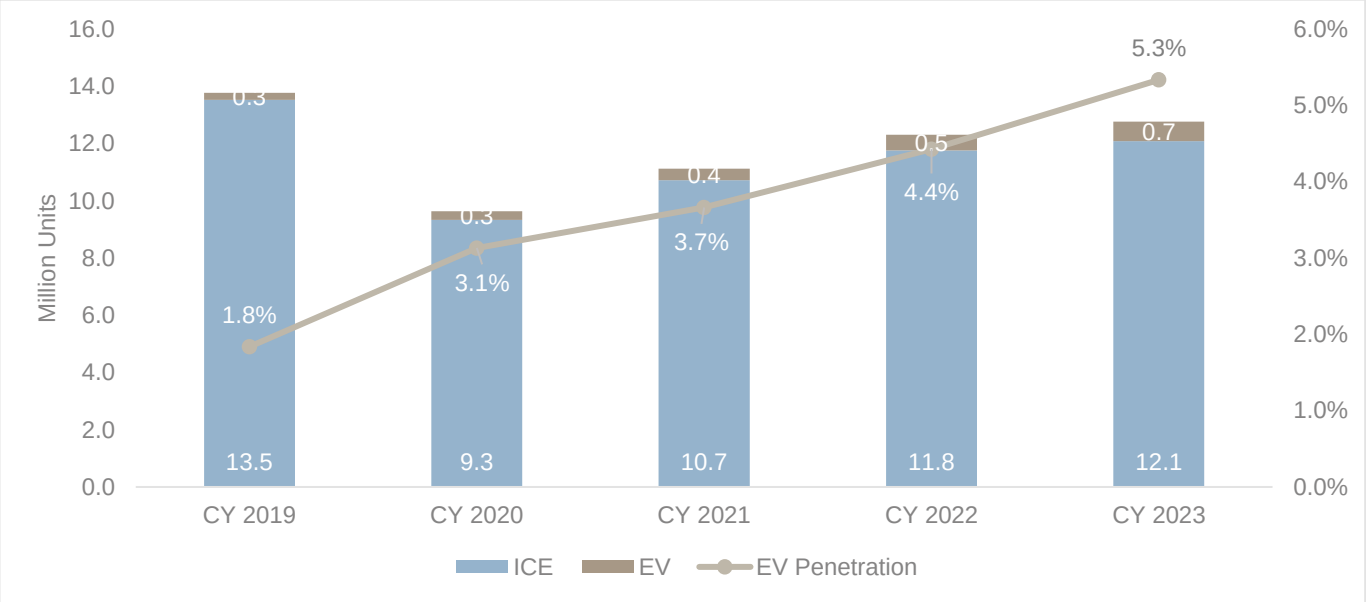


Source: MORDOR Intelligence

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 [and] 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 Intelligence

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

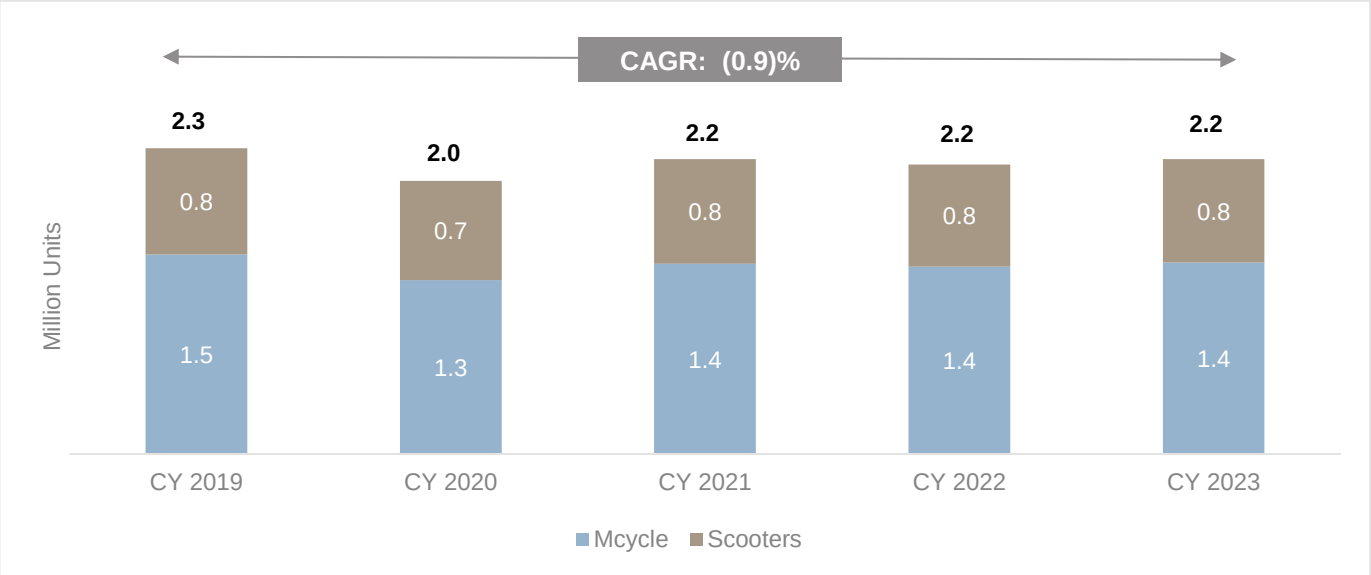
Africa is another large market for two-wheeler sales. Nigeria is the largest market for two-wheelers within Africa with 30% contribution in CY2023.

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.

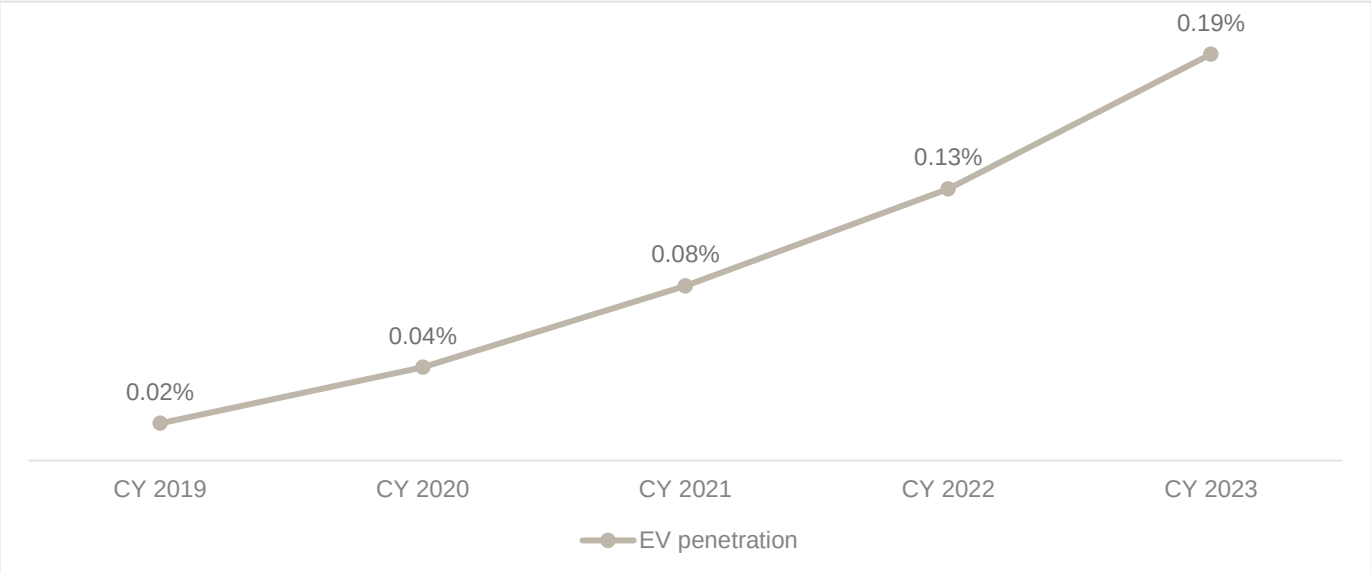
Africa two-wheeler sales volumes trend



Source: MORDOR Intelligence

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 Intelligence

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%.

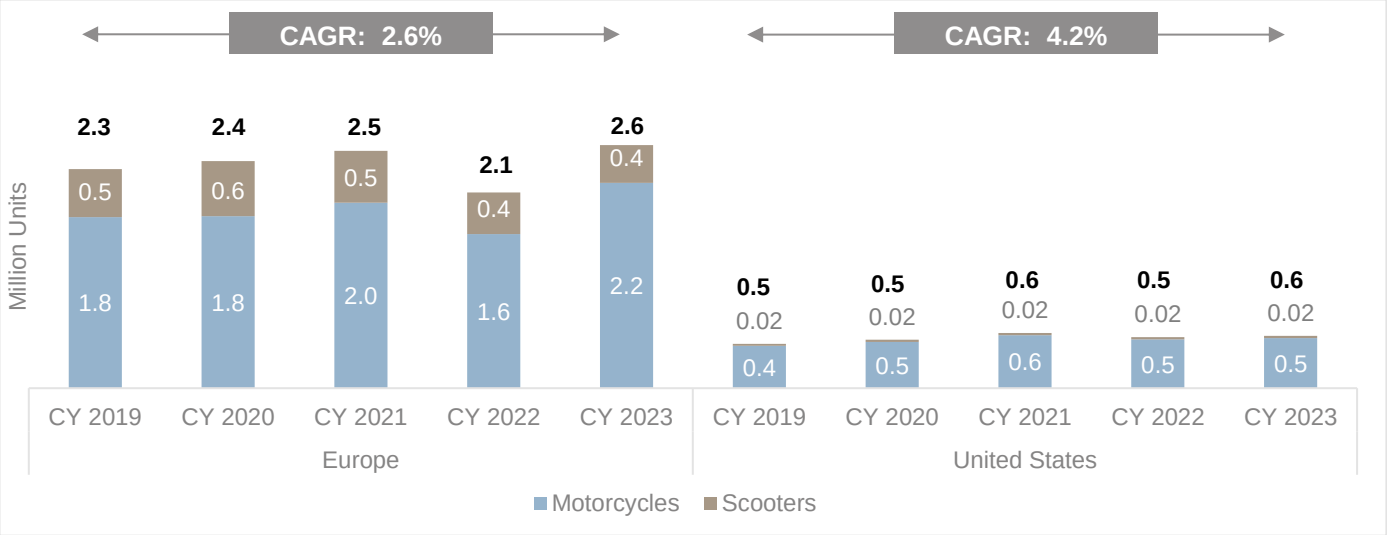
Europe and United States

The developed regions, United States and Europe form a relatively smaller portion of the global two-wheeler demand. 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.

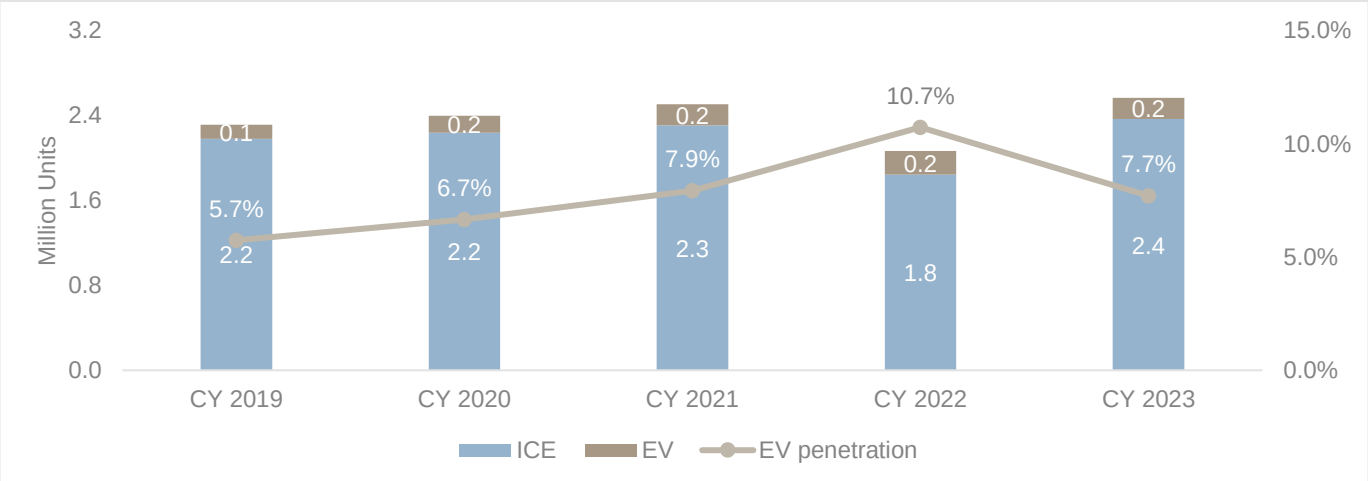
Both markets are predominantly motorcycle markets, wherein their sales contribute ~80% for Europe and 95%+ for US. In fact, within motorcycles, the premium motorcycles are the most preferred segment. Two-wheelers are viewed as lifestyle vehicles in these countries rather than a primary mode of transport.

Europe and United States two-wheeler sales volumes trend



Source: MORDOR Intelligence

Europe EV penetration



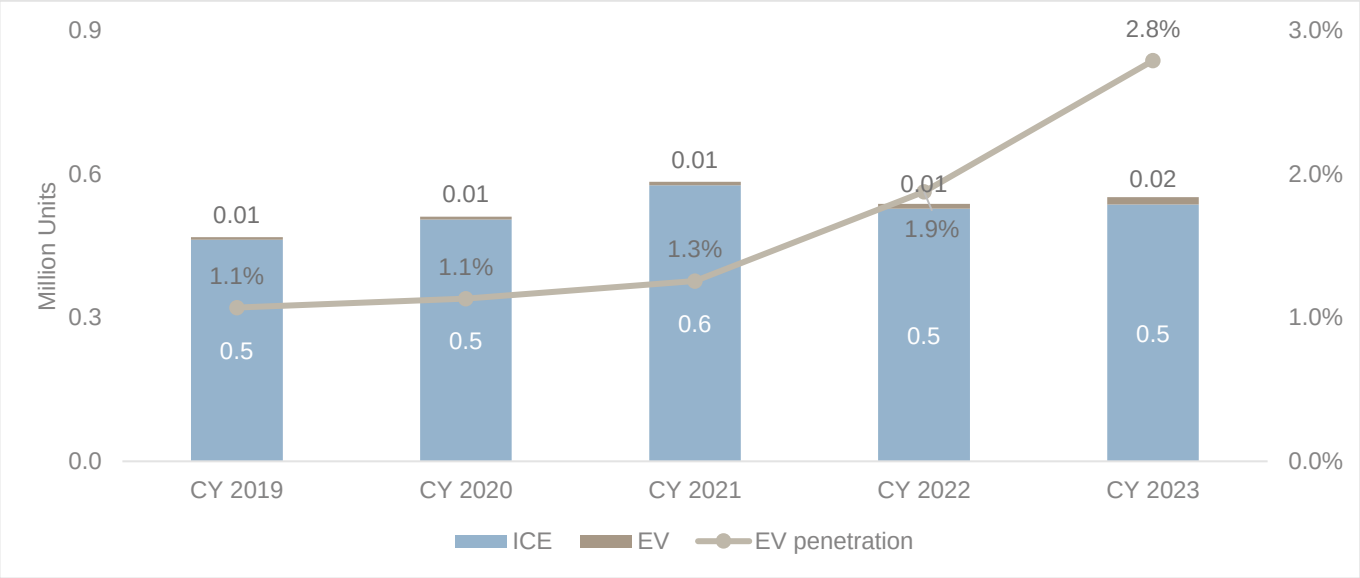
Source: MORDOR Intelligence

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 ecofriendly vehicles backed this growth.

United States EV penetration



Source: MORDOR Intelligence

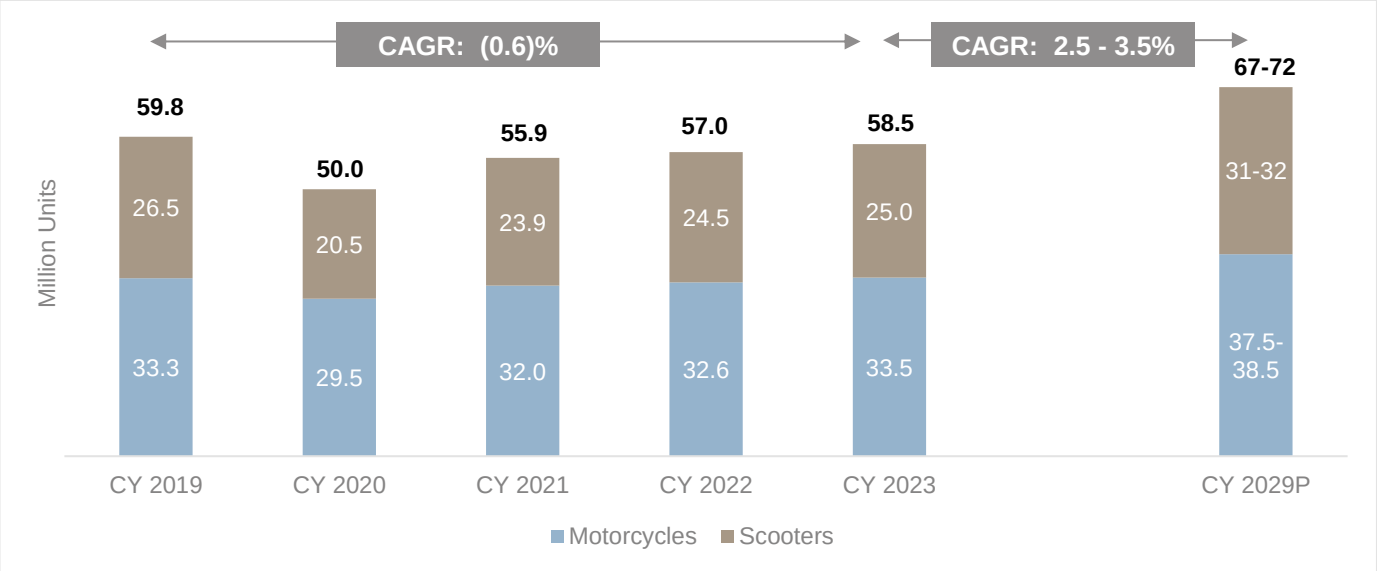
Outlook of the global two-wheeler industry (CY 2023 to 2029)

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 Intelligence] 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 Intelligence

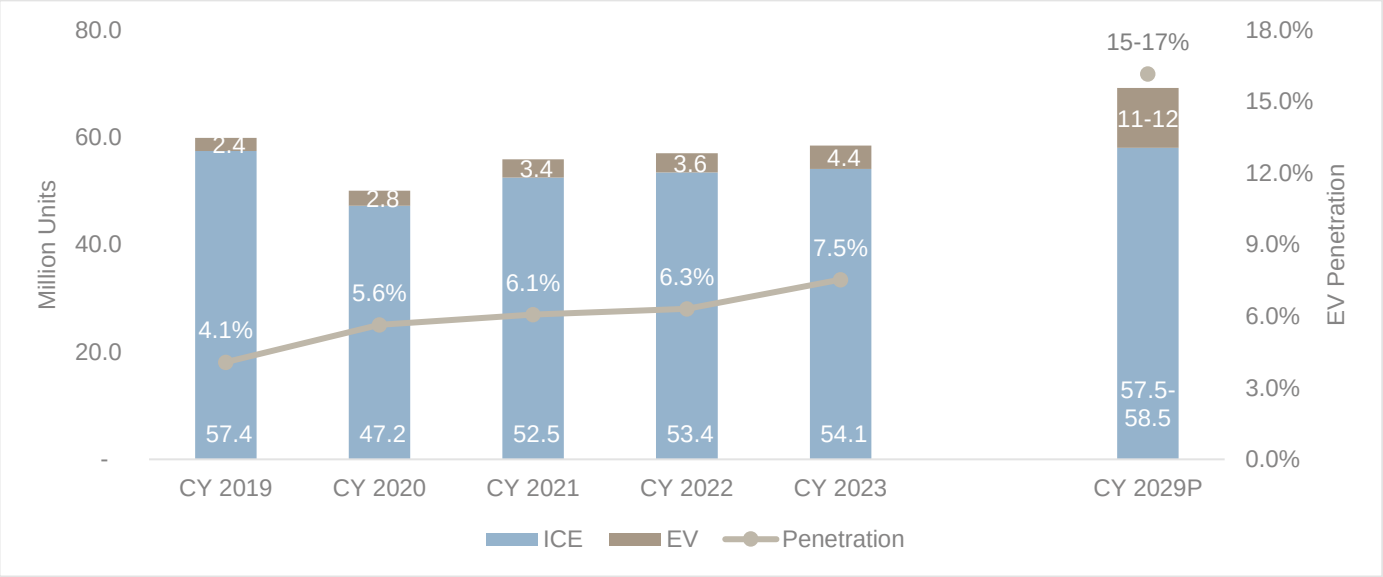
Within the two-wheeler industry, scooters are expected to clock a faster growth of 3.5-4.5%, supported by rising scooterisation in ASEAN countries as well as in India, while motorcycles are projected to witness slower 1.5-2.5% growth. In turn, the share of scooters is projected to reach 45-47% by CY2029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



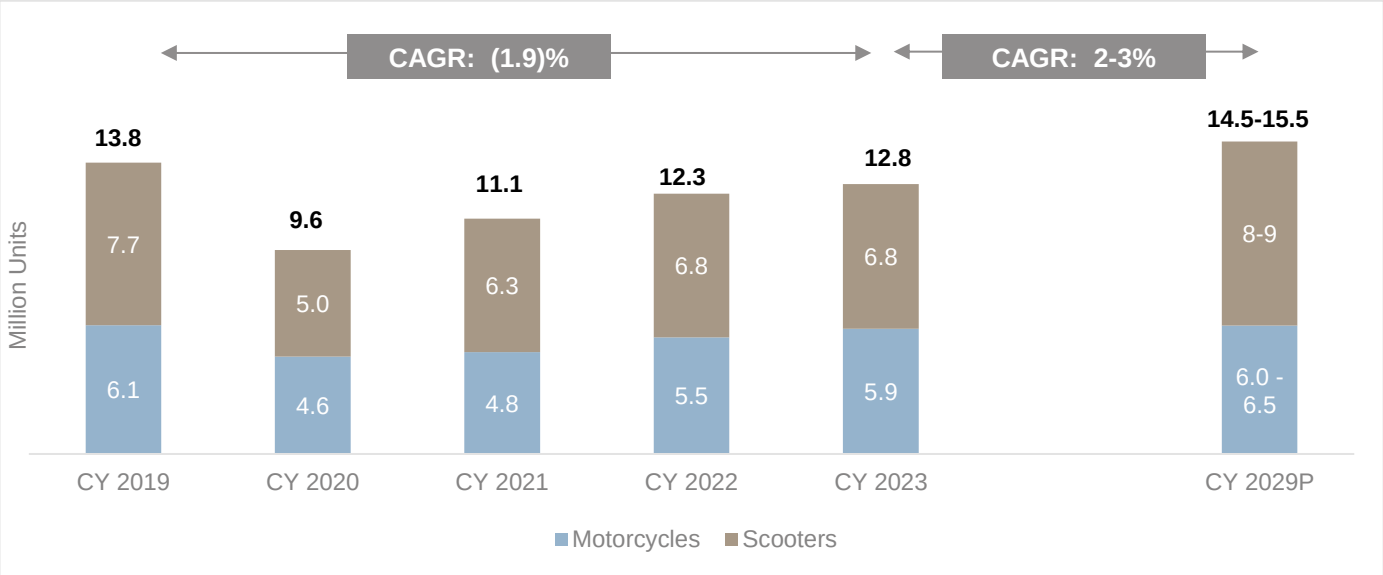
Source: MORDOR Intelligence

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 Intelligence

According to International Monetary Fund [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 ecofriendly vehicles, incentives for EV buyers, rising customer awareness, lowering acquisition costs and low operating costs to aid EV sales going ahead.

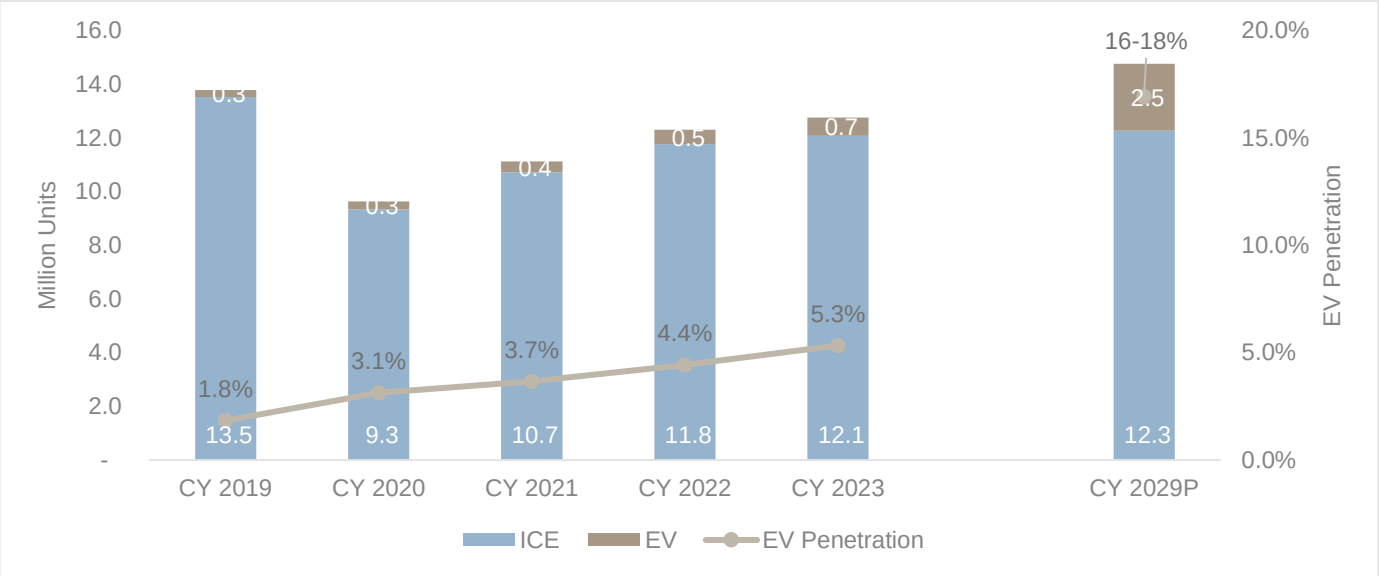
Over and above the incentives for the customers, the governments are also offering incentives in the form of tax breaks for EV manufacturers to set up their plants and are also promoting battery manufacturing capabilities, EV component manufacturing as well as expansion of charging infrastructure. Thailand 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 2W EV sales in the longer run.

According to Mordor Intelligence, 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 Intelligence

Africa

Two-wheeler sales in Africa contracted at 0.9% CAGR during CY2019-2023 period. Going ahead, according to Mordor Intelligence 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.

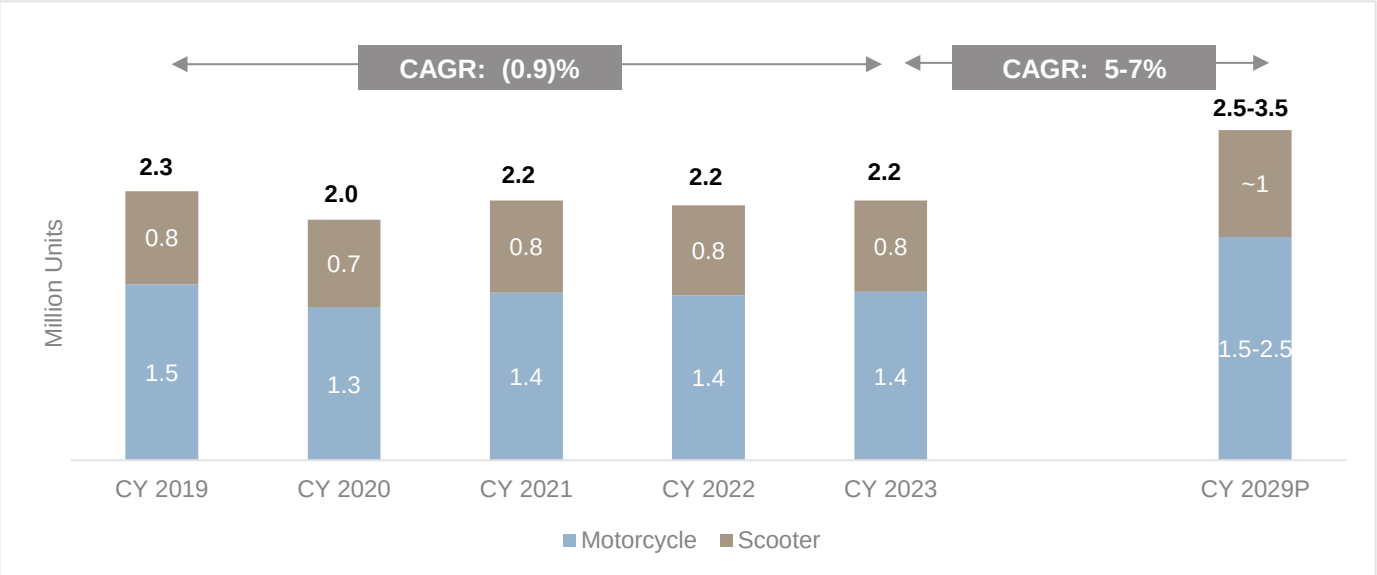
Nigeria's GDP grew at 2% average CAGR during CY2019-2023. The GDP growth is expected to accelerate to 3.2% CAGR by CY2029, according to International Monetary Fund (IMF) estimates. This estimated improvement in incomes levels coupled with expanding vehicle portfolio in the country is expected to provide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

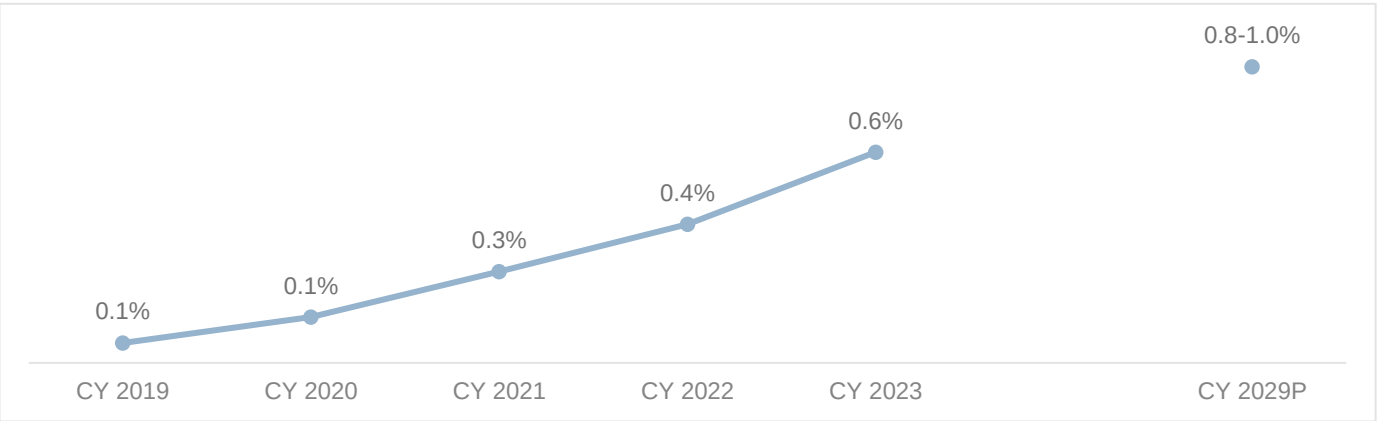


Source: MORDOR Intelligence

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 Intelligence estimates, 2W EV 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

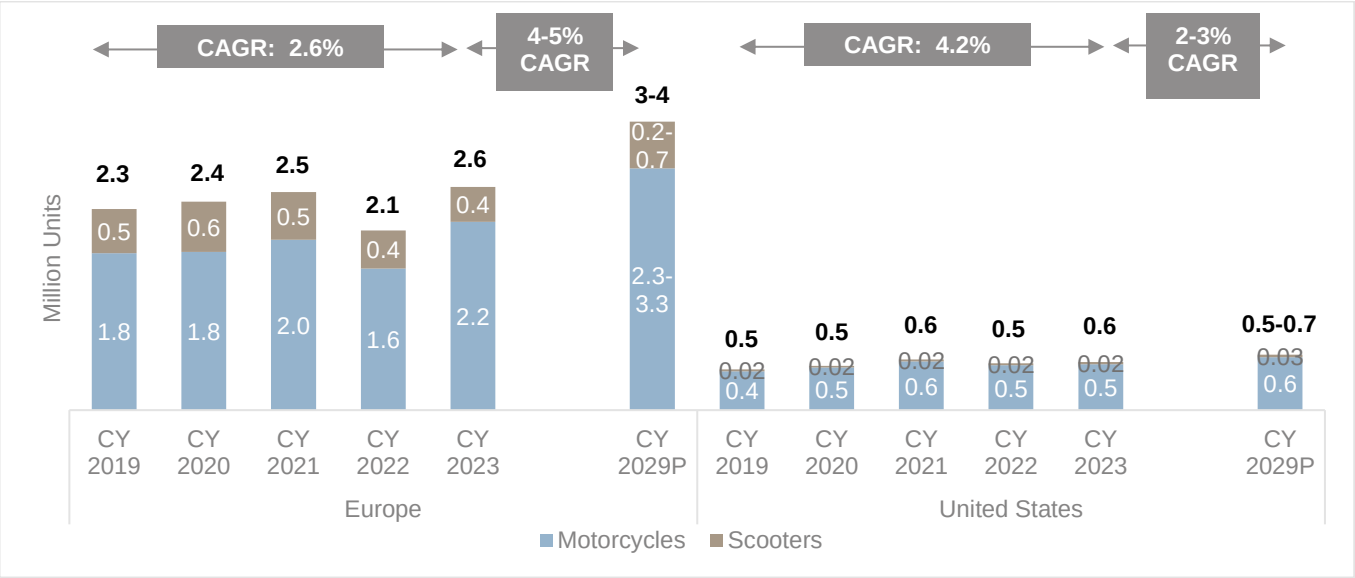


Source: MORDOR Intelligence

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

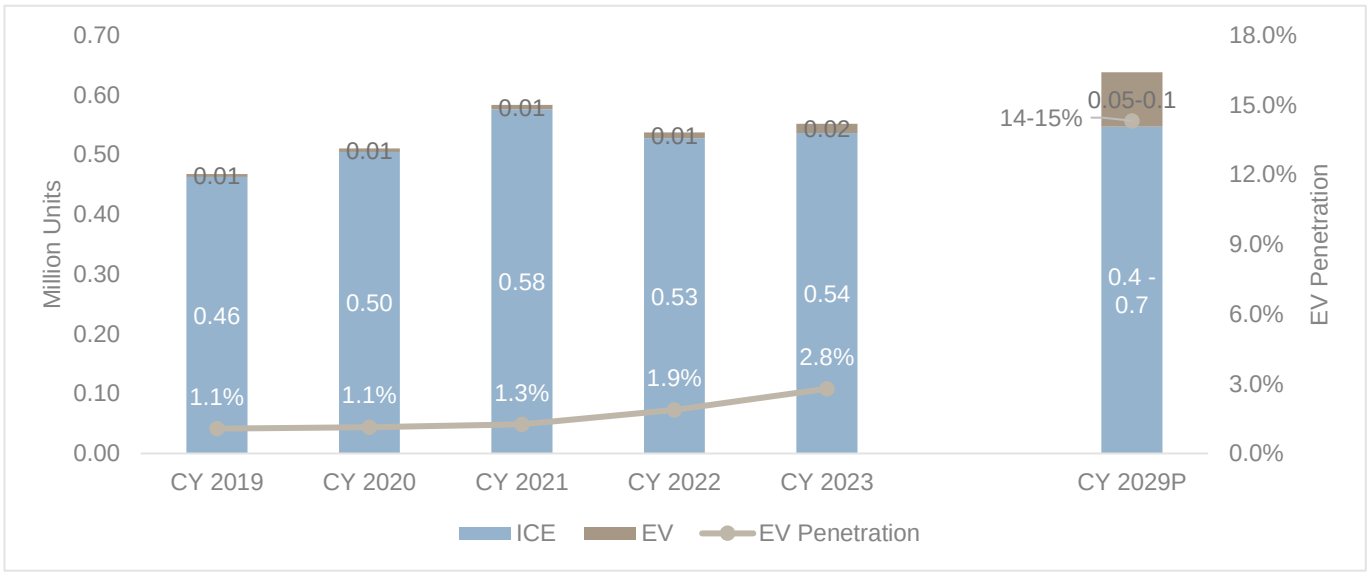


Source: MORDOR Intelligence

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 ecofriendly [2W EV], especially amongst the youngsters is another factor backing the demand growth for United States. 2W EVs are projected to clock a much faster growth at 34-36% CAGR going forward, albeit from a low base.

United States EV penetration Outlook

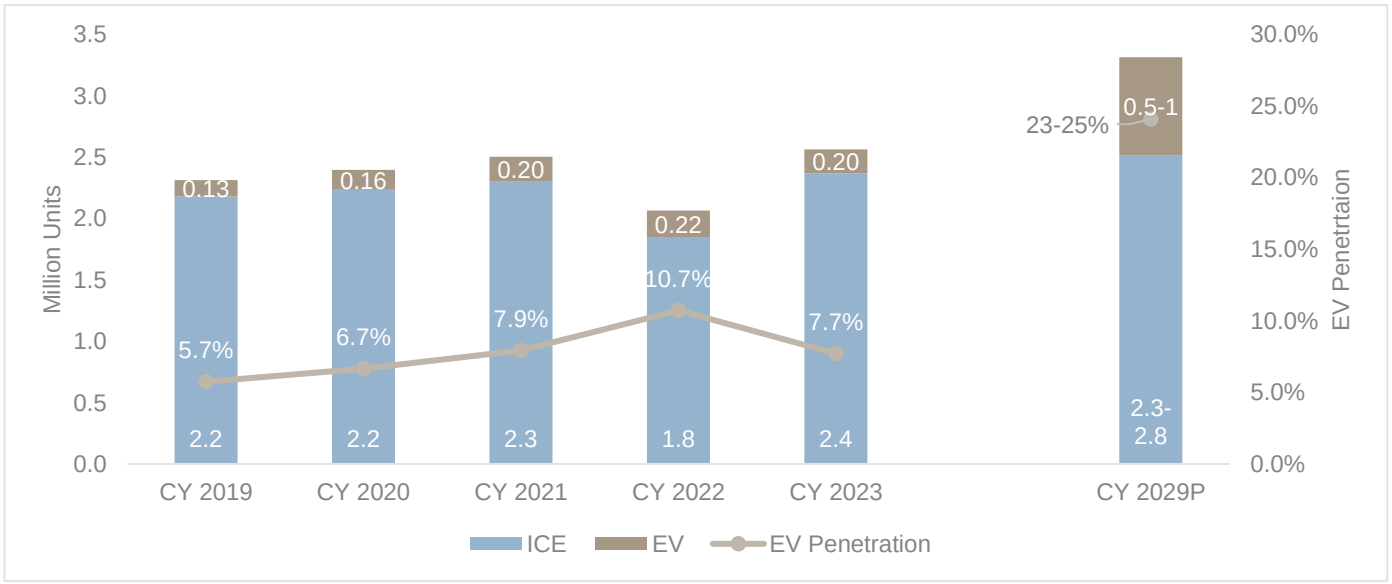


Source: MORDOR Intelligence

According to Mordor Intelligence 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



Source: MORDOR Intelligence

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 Intelligence 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, 2W EVs are projected to grow at 25-27% CAGR, pushing the penetration levels to 23-25% by CY2029.

3. Review and outlook of Indian two-wheeler industry

Review of Indian two-wheeler industry (fiscal 2019 to 2024)

Domestic two-wheeler industry

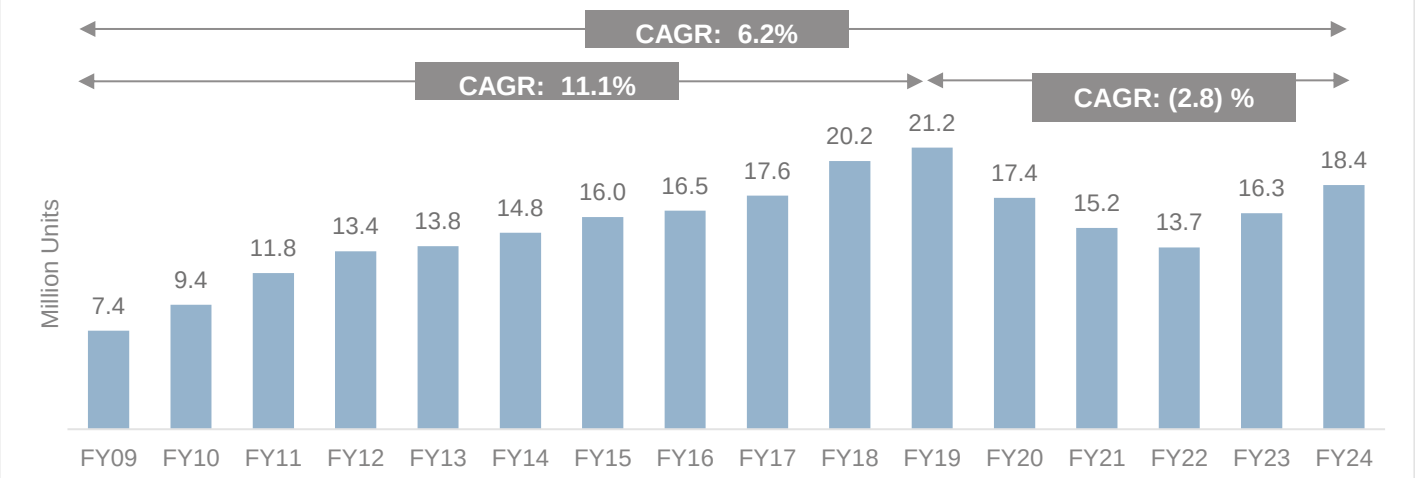
India is the largest motorised two-wheeler market in the world, with domestic sales of 18.4 million units in fiscal 2024. Two-wheeler sales constituted 73% of the total auto market comprising two-wheeler, three-wheelers, passenger vehicles (PVs), commercial vehicles (CVs) and tractors by volume in fiscal 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 most 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. These favourable 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.

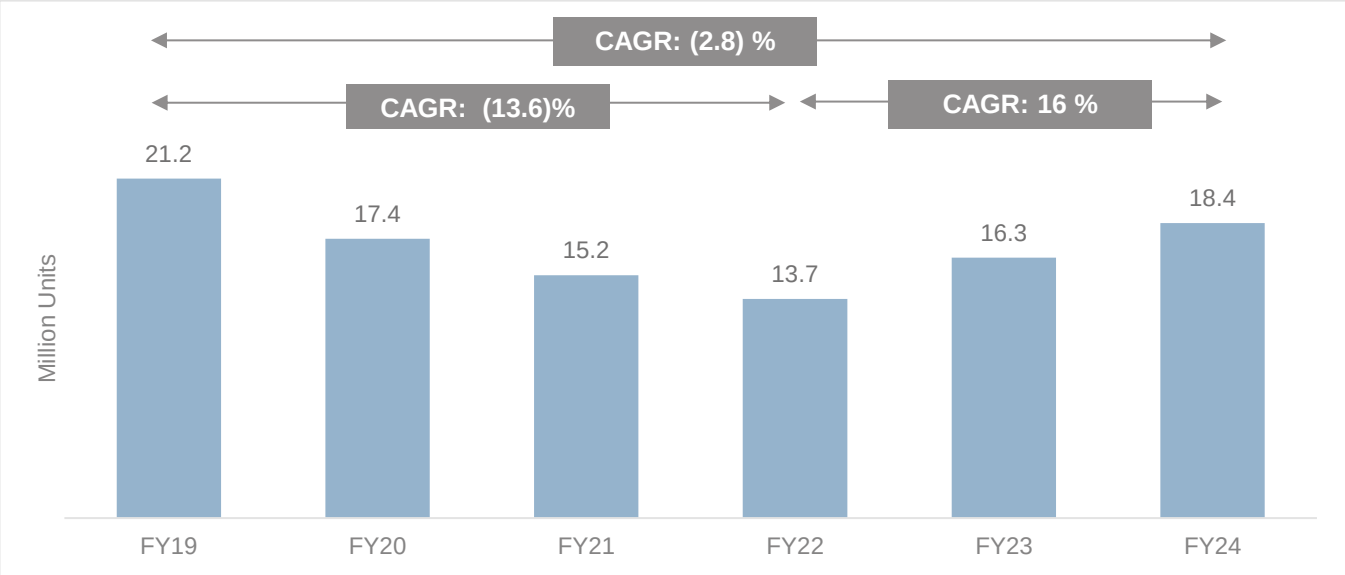
Domestic two-wheeler sales volume trend – fiscal 2009 to fiscal 2024



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



Y-o-Y Growth	FY20	FY21	FY22	FY23	FY24
	-18%	-13%	-10%	19%	13%

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

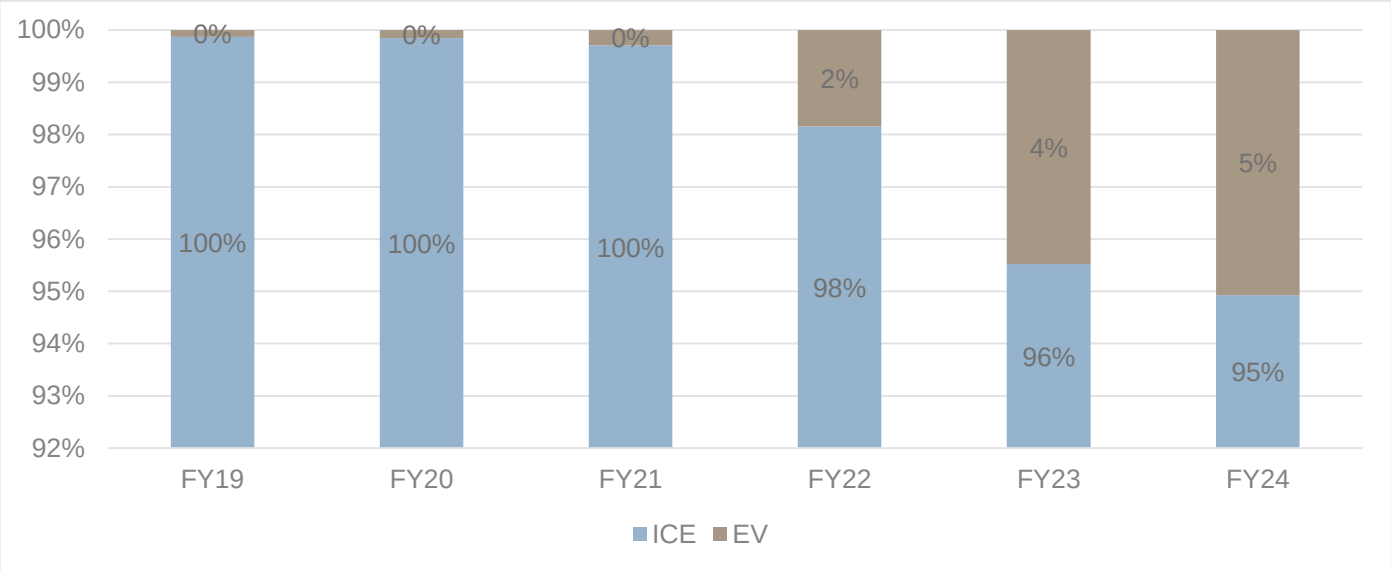
On the reduced base of fiscal 2022, two-wheeler sales rebounded in fiscal 2023 and recorded a healthy growth of 19%, driven by improving demand sentiments and the normalization of economic activities and increased mobility. The pent-up demand, because of the postponement done during the pandemic period 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 2W EVdespite 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.

Domestic two-wheeler ICE-EV sales split trend (ICE vs EV)



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	N.M.*	-4.1%	67.0%	464.1%	187.9%	28.5%	101.7%

Source: SIAM, VAHAN, CRISIL MI&A; N.M. Not Meanigful

The two-wheeler sector is experiencing robust growth driven by several factors such as [Connected, Autonomous, Safety and Electrification]. Further, there is a shift in the [2W industry] with consumers demanding connected vehicles with advanced telematics, which is also accentuated by the increased sales of high-speed 2W EV

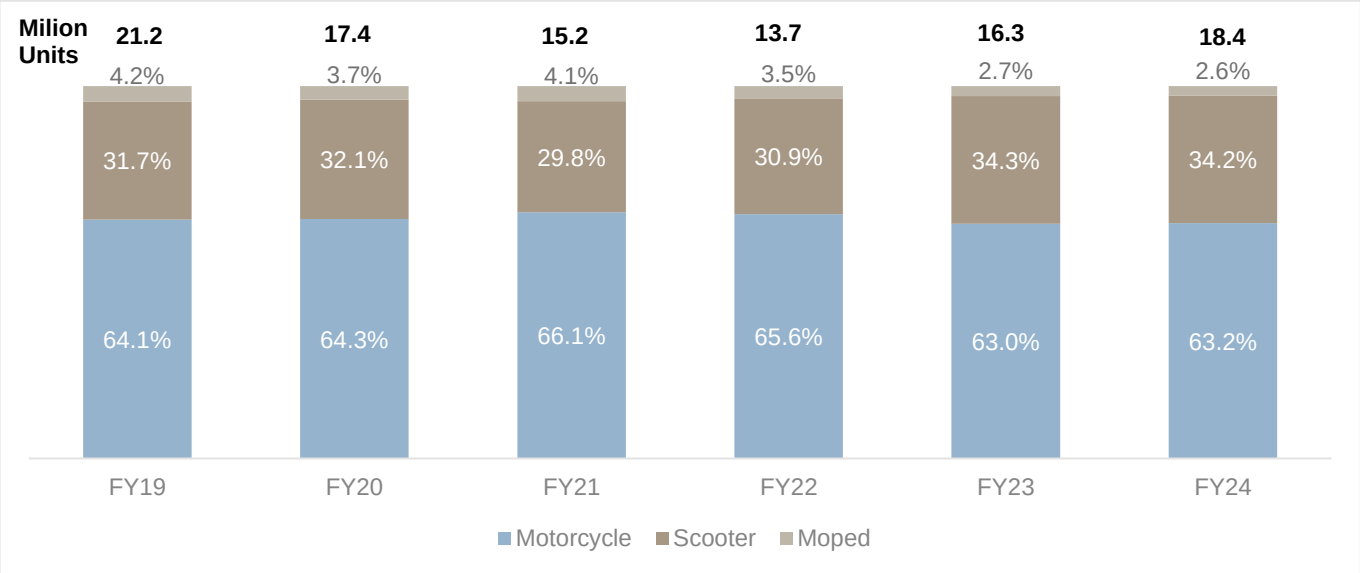
In the last 5 years, the electrification within the two-wheeler [industry] has provided a thrust to the industry sales. Even during the years, when the ICE vehicle sales slid, the sharp rise in EV retails restricted the drop in industry sales volumes. During fiscal 2019 to fiscal 2024 period, ICE segment 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

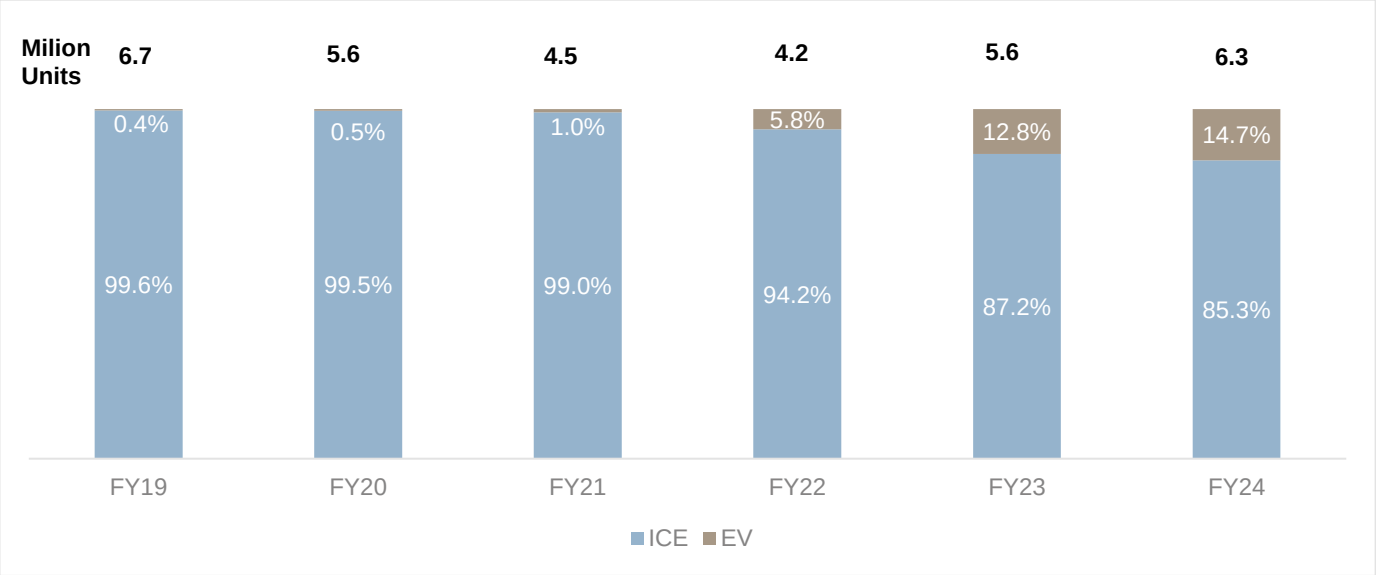
In the last 5 years, share of scooters increased from 31.7% in fiscal 2019 to 34.2% in fiscal 2024. The share of the scooters segment increased on the back of strong demand from new model launches (like the Dio 125, Avenis, upgrades of Activa, Jupiter as well as e scooters), increasing usage of scooters 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 and 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 share 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 and 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.

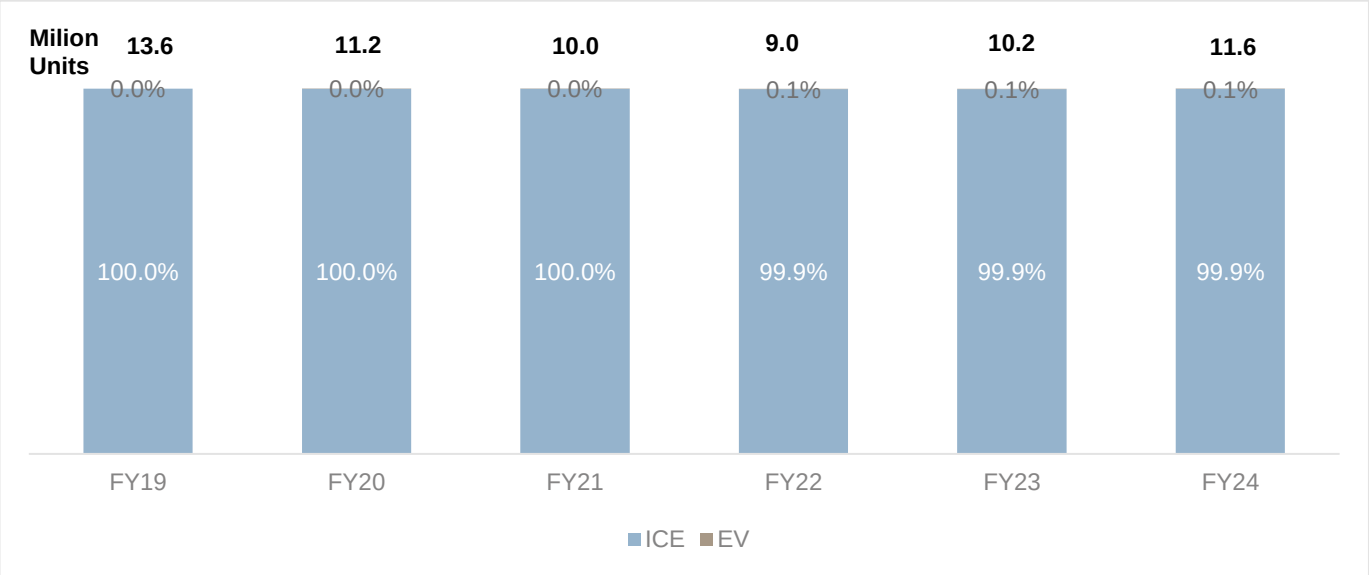
Contrarily, the premium scooters (=>125 cc) segment, clocked a growth at 12% CAGR during the period, albeit from a smaller base. A relatively price agnostic customer base, feature rich attractively designed vehicles, young buyers that prefer high performance and advanced features, auto OEM focus, multiple vehicles 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 and 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 were 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 or 3 years. However, given limited vehicle options that too in the premium motorcycles category, higher acquisitions costs, larger range anxiety concerns 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 on 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 (E.g. (10) to be read as minus 10), EV retail data from VAHAN has been considered.
Source: SIAM, CRISIL MI&A CONSULTING

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.

Cost of Ownership Comparison - EV vs ICE

For the total cost of ownership (TCO) calculation, an annual running of 8000 km is considered, i.e., 25 km per day for 325 days of operation per year. A 7-year holding period is considered, assuming no battery replacement happens during the ownership period.

As of fiscal 2024, [TCO] of an 2W EV, even without a subsidy, was 37% lower than that of an ICE 2W for an annual running of 8,000 km. With subsidy this difference increased to 55% for fiscal 2024.

Going ahead, by fiscal 2031, 2W EV ownership is expected to become financially more lucrative. For an annual running of 8,000 km, the 2W EV TCO is projected to be 52% lower than its petrol counterpart even without the subsidy. Total cost of ownership for an 2W EV is decreasing over the years amidst the lowering global battery prices, economies of scale and improving technology resulting in higher manufacturing efficiency of the electric vehicles.

Despite the favourable TCO, the acquisition cost for an 2W EV was more than 40% higher than its ICE counterpart during fiscal 2024. However, the price gap between the two is expected to narrow going ahead, with expected decline in battery prices. Considering the GST and road tax benefits to continue, the price gap between the acquisition costs of EV and ICE are projected to shrink to 5-10% by fiscal 2031.

TCO for seven-year ownership without subsidy

Year/Annual Running	3,000 km	6,000 km	8,000 km	10,000 km	12,000 km
Fiscal 2024	5% lower cost than petrol	28% lower cost than petrol	37% lower cost than petrol	44% lower cost than petrol	49% lower cost than petrol
Fiscal 2031	32% lower cost than petrol	46% lower cost than petrol	52% lower cost than petrol	56% lower cost than petrol	60% lower cost than petrol

TCO for seven-year ownership with subsidy

Year/Annual Running	3,000 km	6,000 km	8,000 km	10,000 km	12,000 km
Fiscal 2024	34% lower cost than petrol	49% lower cost than petrol	55% lower cost than petrol	59% lower cost than petrol	62% lower cost than petrol
Fiscal 2031	32% lower cost than petrol	46% lower cost than petrol	52% lower cost than petrol	56% lower cost than petrol	60% lower cost than petrol

Note:

Convenience ICE scooter and Convenience E scooter have been considered for the comparison

Subsidy Scenario includes both Central and State subsidy and have been considered till fiscal 2026, no subsidy is considered between fiscal 2026 and fiscal 2036

Above analysis is done without considering battery replacement

In case of battery replacement, TCO for an EV was 41% lower than ICE vehicle TCO in fiscal 2024 and it will be 55% lower than ICE vehicle TCO by fiscal 2031 considering 8000 km annual running, 7 year holding period and no subsidy.

According to Ather Energy, battery packs can last for 7 years without a battery replacement, however, the battery can degrade in case of extreme use cases such as excessive use of fast charging, accidental damages, lack of periodic maintenance, use of unauthorized chargers, extended exposure to temperatures higher than 50 degrees Celsius and prologued idle periods.

Source: CRISIL MI&A

EVs currently offer much better technological features compared to an ICE vehicle. For example, premium variants of the EVs are equipped with touch screen HMI, Bluetooth and LTE connectivity. However, premium ICE counterparts offer only Bluetooth connectivity and basic smart connected features.

The acquisition cost of a comparable ICE 2W with Bluetooth connected features is currently 60%+ lower than the EV variant with a Touchscreen display and the software pack.

By fiscal 2031, the acquisition price gap between the ICE vehicle (with a touchscreen, connected features) and a comparable EV will narrow down to 8-12%.

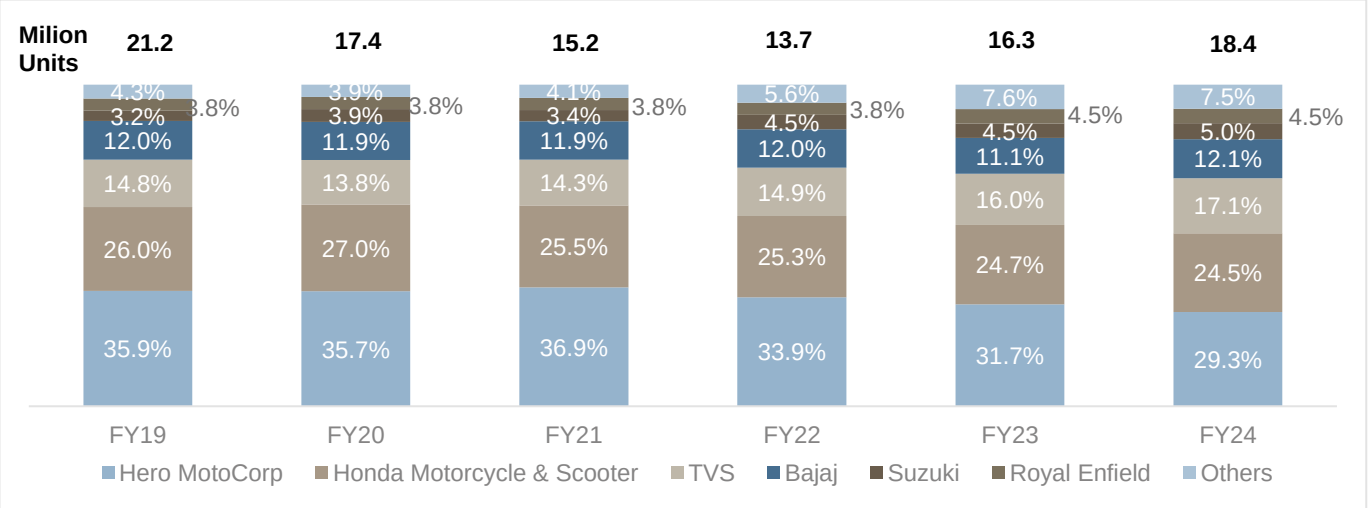
Competitive landscape of the domestic two-wheeler industry

India's Two-wheeler industry is an oligopolistic market with the top 4 players (HMCL, HMSI, Bajaj and TVS) 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 its share slid from ~36.0% 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 and Scooter (HMSI) has also lost some ground to other players, especially the E scooter manufacturers.

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

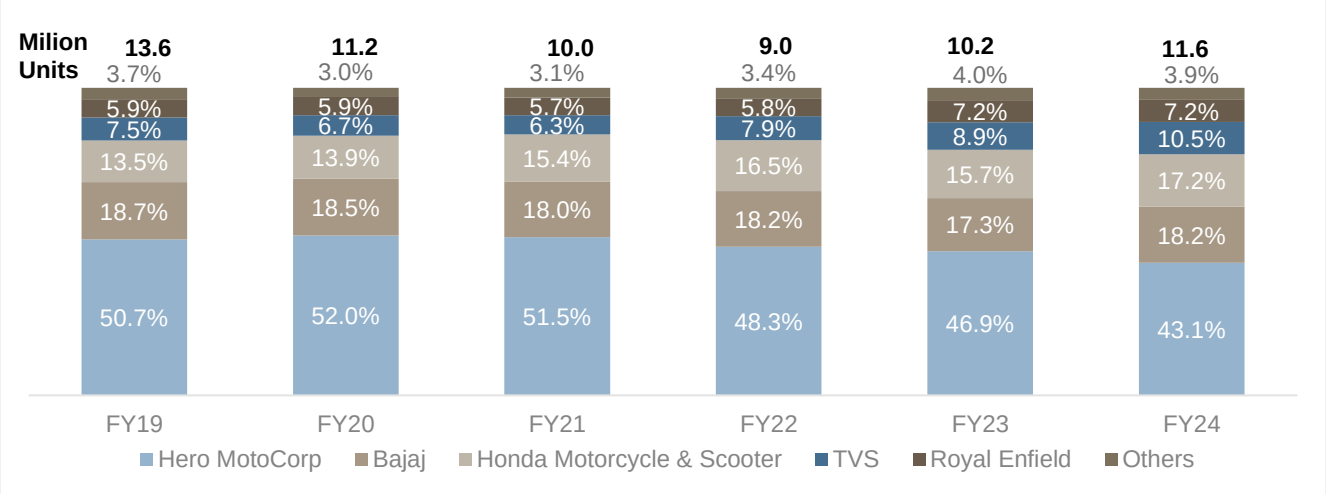


Note: Data includes ICE and EVs; EV retail data from VAHAN has been considered.
Source: SIAM, VAHAN, CRISIL MI&A

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 and 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 and 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

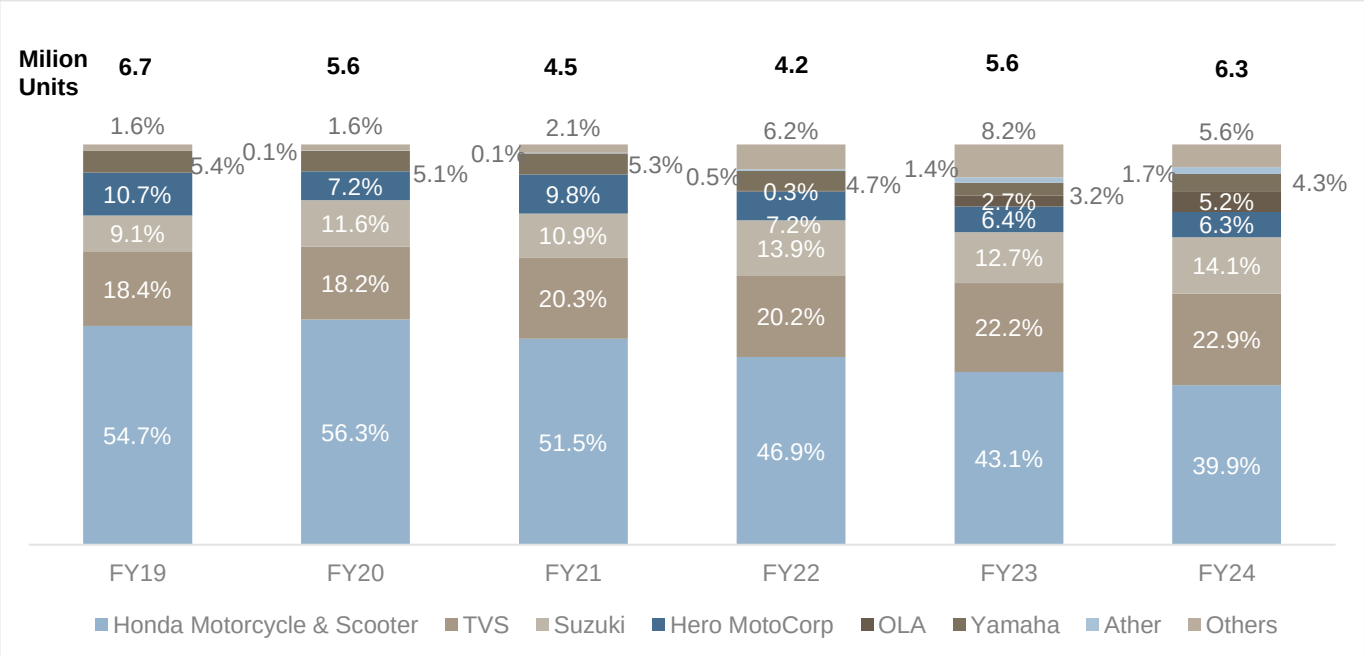
The overall motorcycles segment is dominated by HMCL, that is also the leader in the commuter motorcycles segment. However, given the pressure on sales of the commuter motorcycles segment and intensifying competition in premium motorcycles, HMCL lost some ground to TVS, HMSI and Royal Enfield from an 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

1. 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 and Ather. However, increased demand for the premium variants of its scooters Activa 125 and Dio 125 helped the company limit its share contraction.

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

3. 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.

4. 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).

5. 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.

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

Competitive landscape of the 2W EV industry

The 2W EV segment has been highly concentrated with a few players primarily catering to the entire segment. During fiscal 2019, a few OEMs like Hero Electric and Okinawa completely dominated the market with more than 80% of the market share. Over the years, with the entry of new players, EV launches from legacy ICE OEMs as well as expansion in EV portfolio of players, competition intensified within the EV space.

High speed vehicles offered initially by Hero Electric and Okinawa offered relatively lower speed and acceleration compared to the ICE counterparts. Ather entered the market in fiscal 2019 with S450 model which offered comparable power and acceleration as an ICE vehicle and paved the way for customer shift from ICE to EVs. This helped Ather grab a sizeable share of the market in fiscal 2020 and managed to maintain that share despite the intensifying competition in the next 4 years. Intermittent launches, state of the art product offering, expansion in retail network and development of the overall 2W EV ecosystem has helped the company maintain its momentum in the market.

OLA entered the EV market in fiscal 2022 and expanded its presence at a very fast pace and became the leading contributor to EV retails in India. Expansion in product portfolio, distribution network as well as supporting growth in production levels thrusted the contribution of OLA in 2W EV market.

The legacy OEMs TVS and Bajaj entered the EV space after some deliberation. TVS introduced the iQube model in fiscal 2020, but only gradually increased its supply over the years. It's one model iQube received healthy traction and clocked second highest retails during fiscal 2023 and extended its presence further in fiscal 2024.

Bajaj's Chetak EV was introduced in Q4 of fiscal 2019 in limited markets. The company gradually expanded its presence across markets in the next few years. With increased company focus, coverage expansion and higher production, the company's share increased to nearly 11% in fiscal 2024.

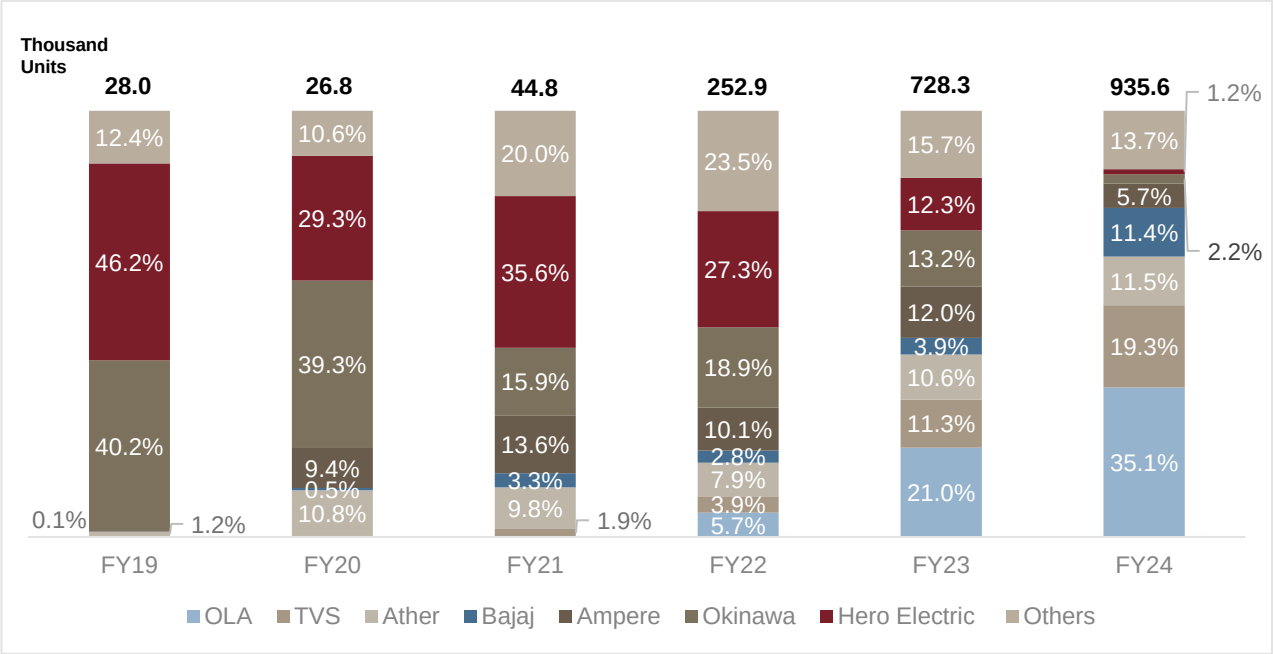
Ampere entered the market in fiscal 2020 and gradually expanded its presence in the 2W EV space. In fiscal 2023, company's contribution reached 12% levels. However, amidst the increased competition especially from OLA and TVS, the company lost some ground during fiscal 2024.

HMCL entered the EV segment with Vida in fiscal 2023. In the two years, the company's contribution increased to ~2% by fiscal 2024.

Erstwhile leading contributors in the 2W EV industry, Hero Electric and Okinawa faced stiff competition from newer entrants and increased focus from other legacy two-wheeler manufacturers. From a high base, their share contracted

in the next 3 years. Furthermore, in fiscal 2024, both these companies received a heavy jolt from the government notice for debarment from the FAME-II Scheme. The government also sought the recovery of incentives claimed since fiscal 2020 from the two companies. The debarment cost companies their share in fiscal 2024. However, in April 2024, the two companies have been given a clean chit in the case.

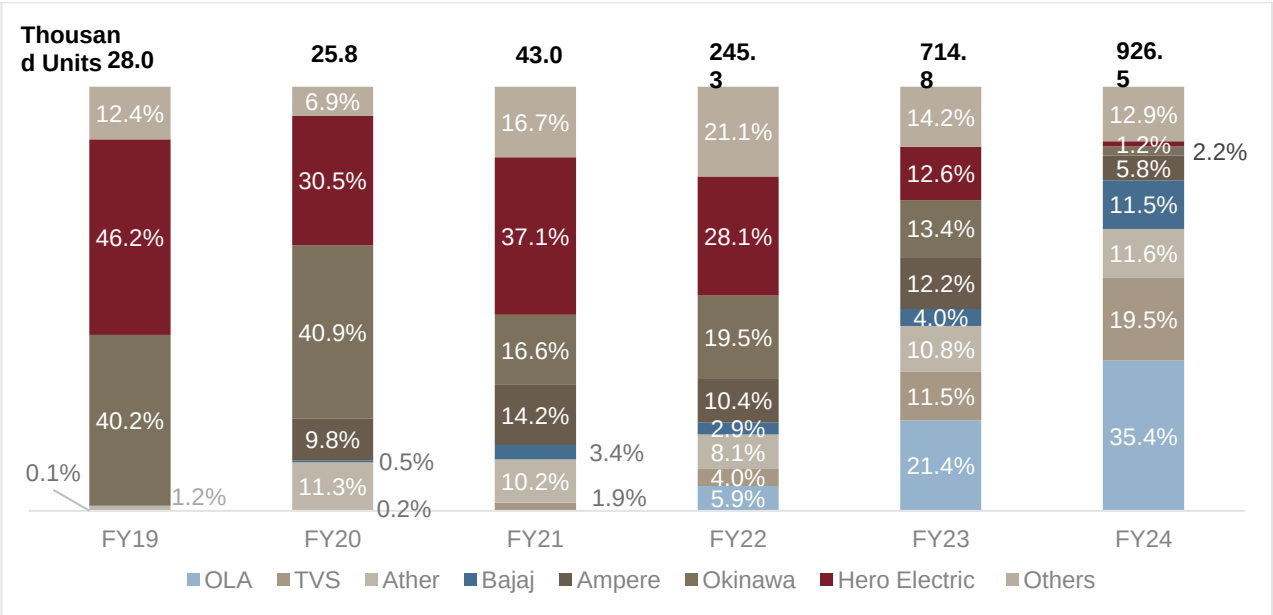
OEM wise contribution to 2W EV retails



Source: VAHAN, CRISIL MI&A

Given more than 98% contribution of scooters in 2W EV retails, OEM wise contribution for scooters is in line with the OEM wise contribution for overall E 2W segment.

OEM wise contribution to E Scooters retails



Source: VAHAN, CRISIL MI&A

Revolt Motors introduced E-motorcycle/ E bike in India and continue to dominate this small subsegment. Tork Motors has gained some ground in fiscal 2024. New launches from Ultraviolette aided company share expansion especially in fiscal 2024.

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, i.e., 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
India	175
Brazil	136
Mexico	42
Indonesia	423
Malaysia	406*
Taiwan	592
Vietnam	613*
Korea	44
United States	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:

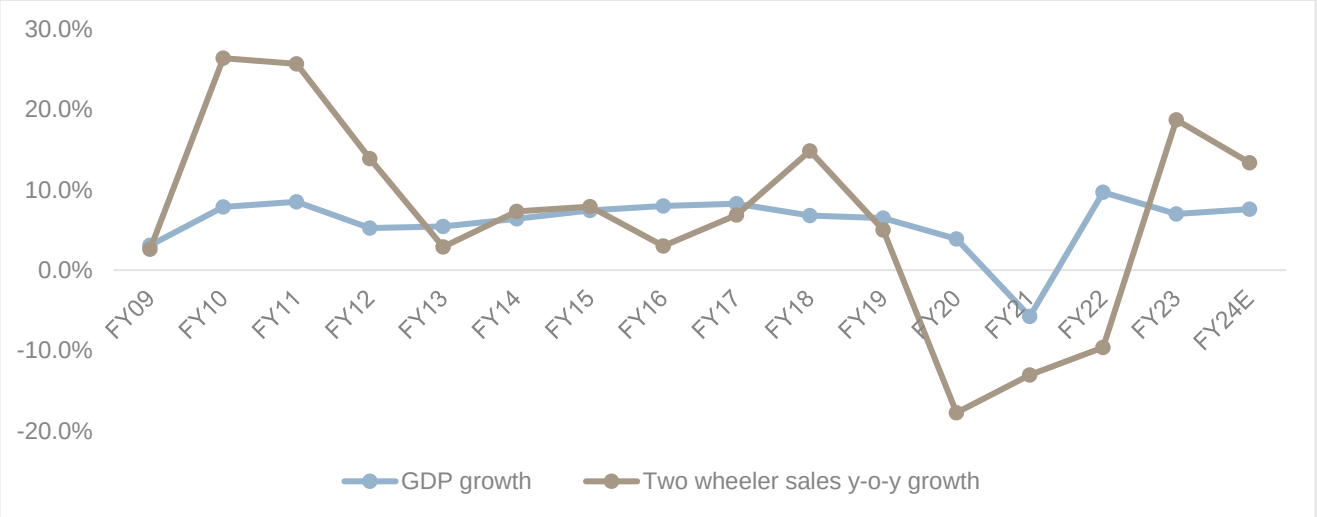
Macroeconomic support

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.

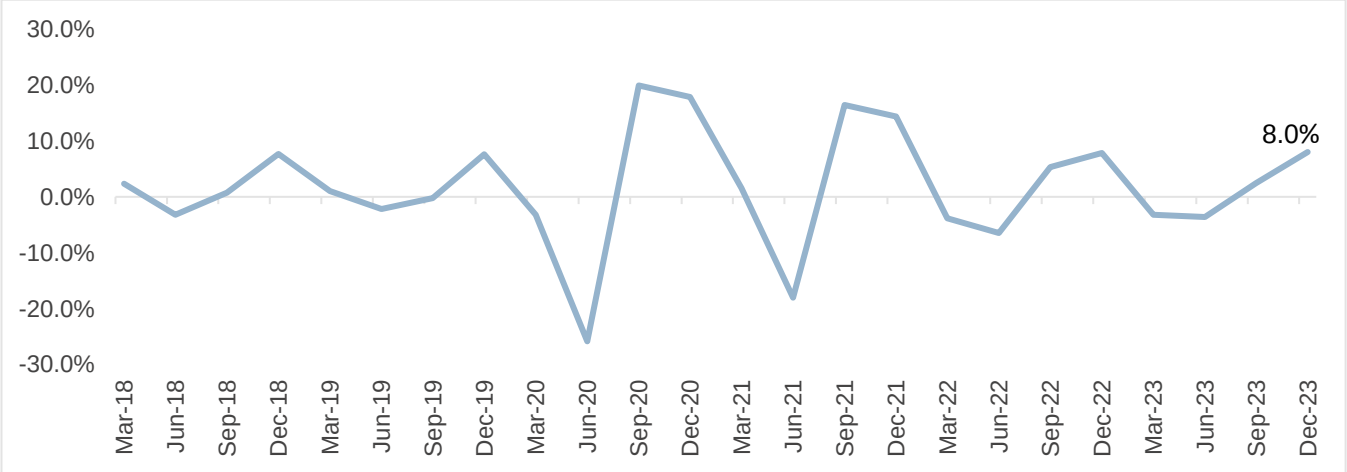
Going ahead, CRISIL expects India's GDP to clock a healthy growth at 6.5-7.5% CAGR (till fiscal 2031) aiding the growth of domestic two-wheeler industry sales over the long-term horizon.

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



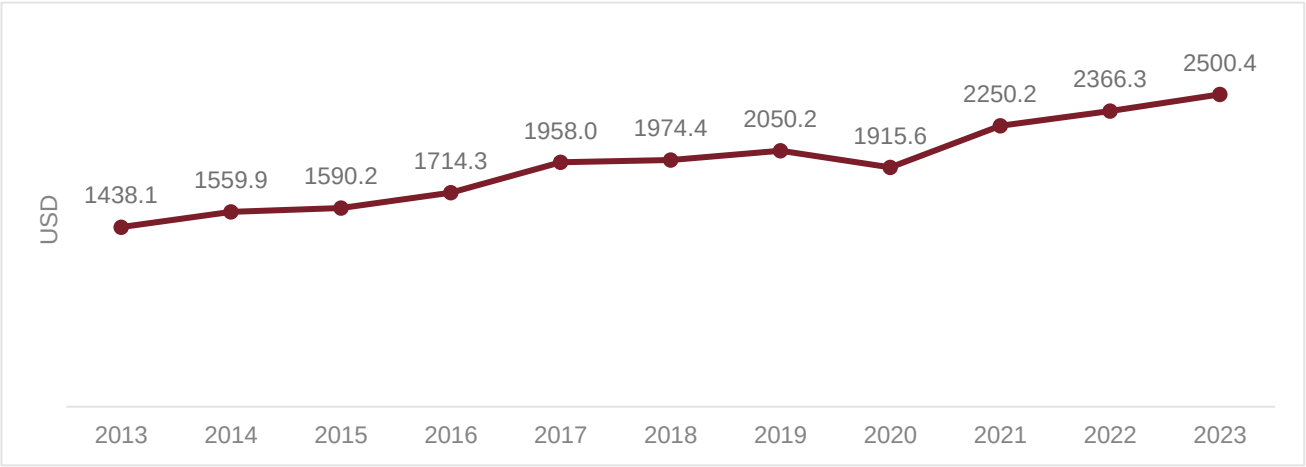
Source: Industry, CRISIL MI&A

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 2,500.4 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, International Monetary Fund (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.

Agricultural incomes

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.

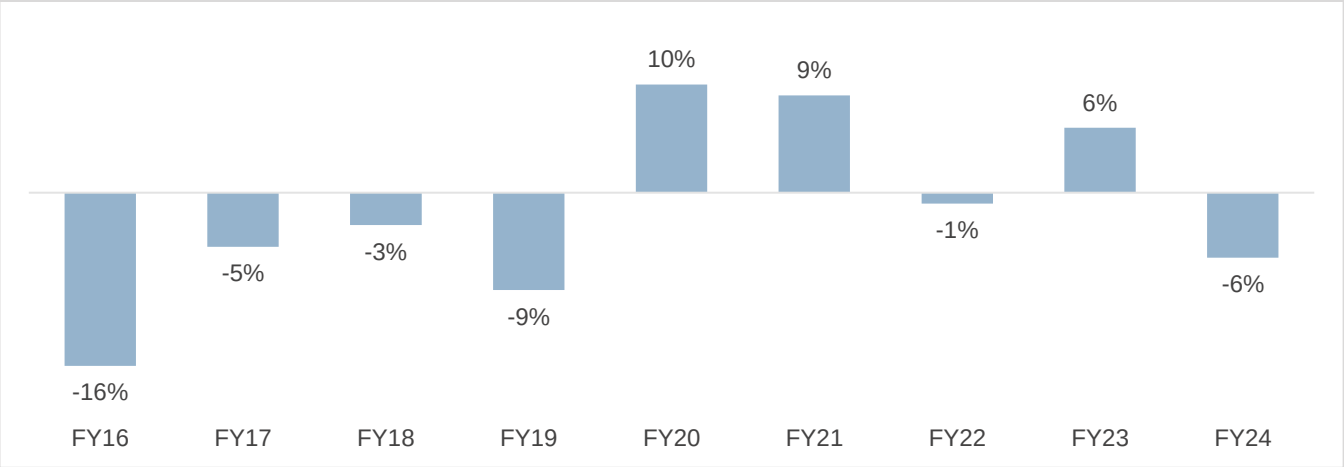
Within two-wheelers, although motorcycles are the preferred choice for rural customers, improvement in rural infrastructure and road connectivity has helped scooters segment to make inroads in rural areas. With rising electrification, a significant portion of EV demand is also coming from tier 3 and 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 favourable 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 favourable 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.

Rural Infrastructure

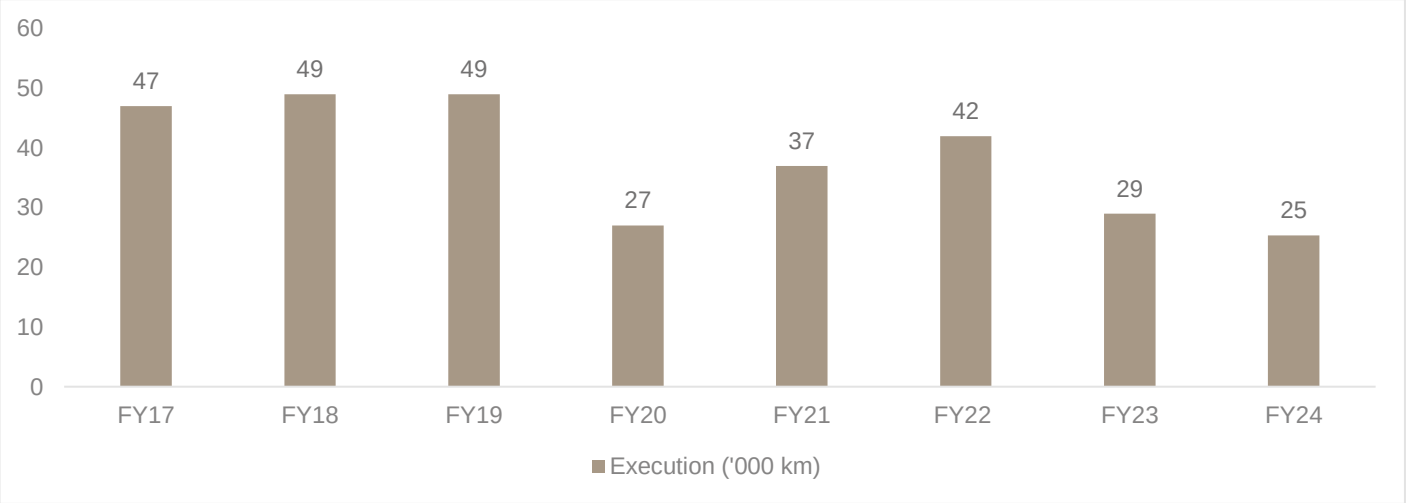
Rural infrastructure also has a pronounced impact on rural incomes and, in turn, two-wheeler sales. Under the Pradhan Mantri Gram Sadak Yojana (PMGSY), launched in 2000, the government aims to build all-weather roads in rural India to improve connectivity as well as support the rural economy.

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

Financing support

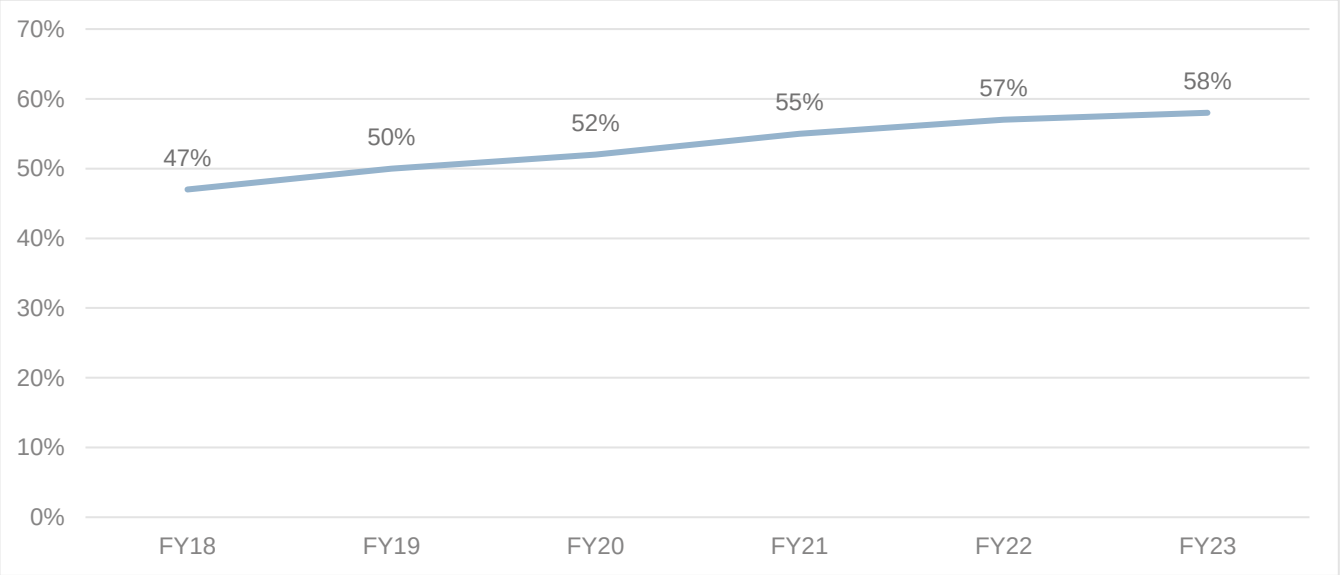
Finance support plays an important role in the overall demand growth of the two-wheeler industry given the relatively lower income profile of customers as well as smaller ticket size of the industry.

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



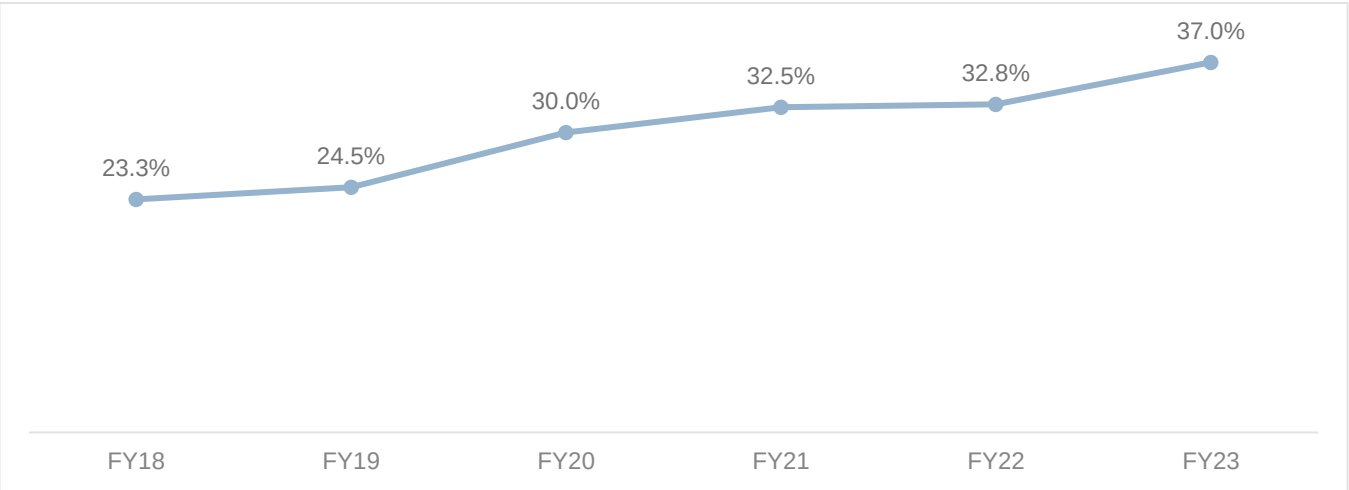
Source: CRISIL MI&A

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

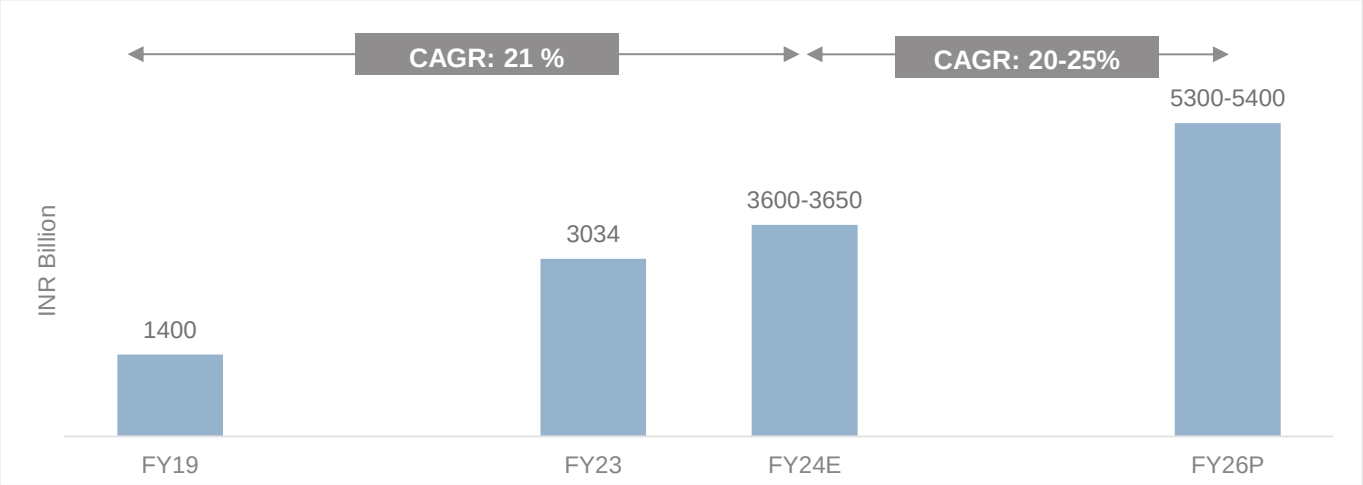
The gig economy is a significant contributor to the two-wheeler industry demand in the form of last mile delivery vehicle requirement.

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 sector, estimated at ~Rs 3.1 trillion 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

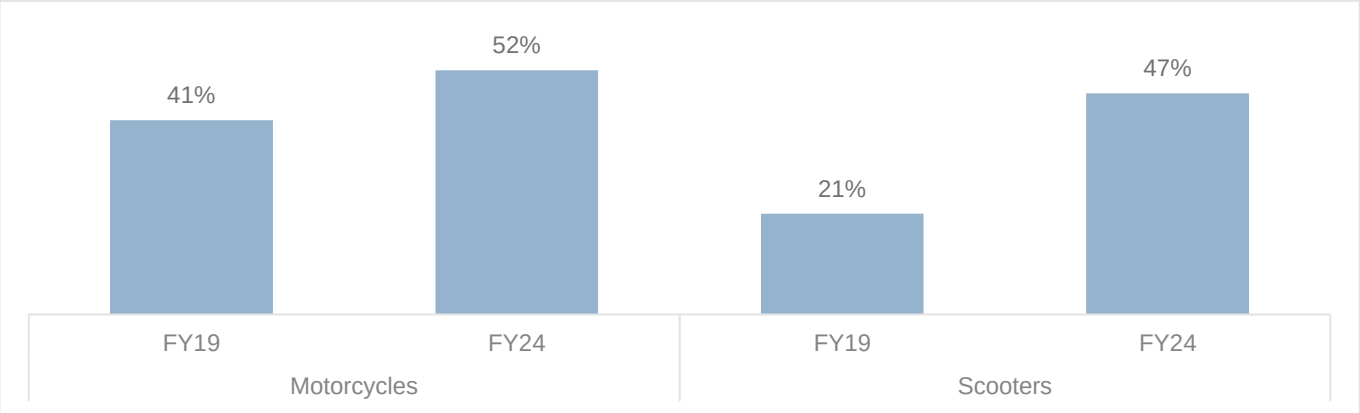
There is a clear shift towards premium vehicles being witnessed within the two-wheeler industry. Customers are looking to upgrade to the next premium vehicle segment within motorcycles as well as scooters. Younger profile of the buyers, attractive feature rich new vehicle launches at competitive rates, 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 and 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 CONSULTING

Electrification within the industry

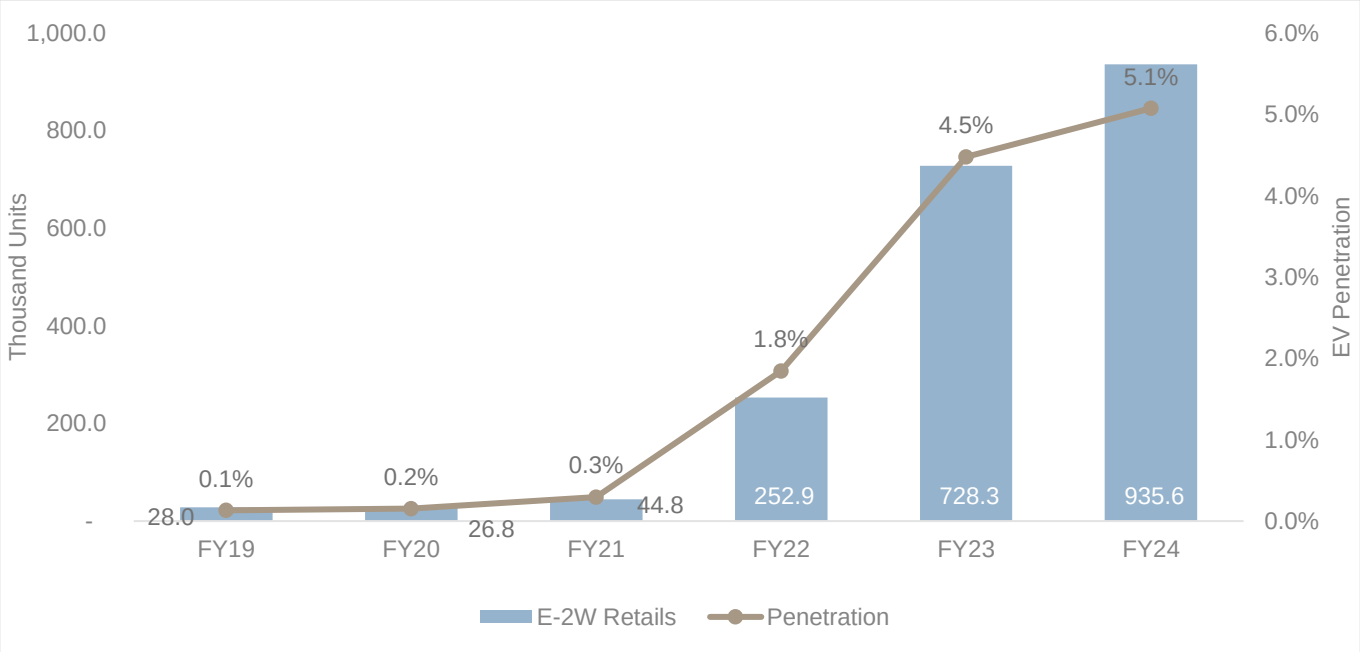
EVs are gaining global interest amidst the need to curb pollution. In India, too, EVs are gaining popularity, as the government is extending support via [Faster Adoption and Manufacturing of Hybrid and Electric vehicles (FAME II)] and tax rate cuts to encourage EV adoption. Further, growing awareness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

EV retail sales trend in India

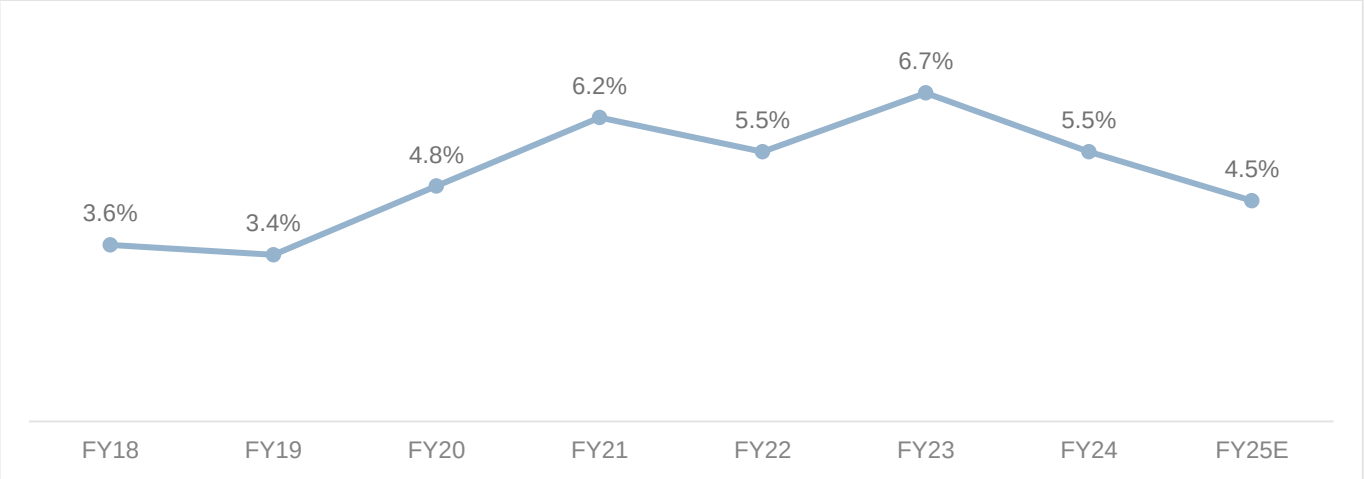


Source: VAHAN, CRISIL MI&A

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

Shrinking replacement cycles

Amidst the expanding vehicle portfolio, entry of newer players into the industry-global and 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.

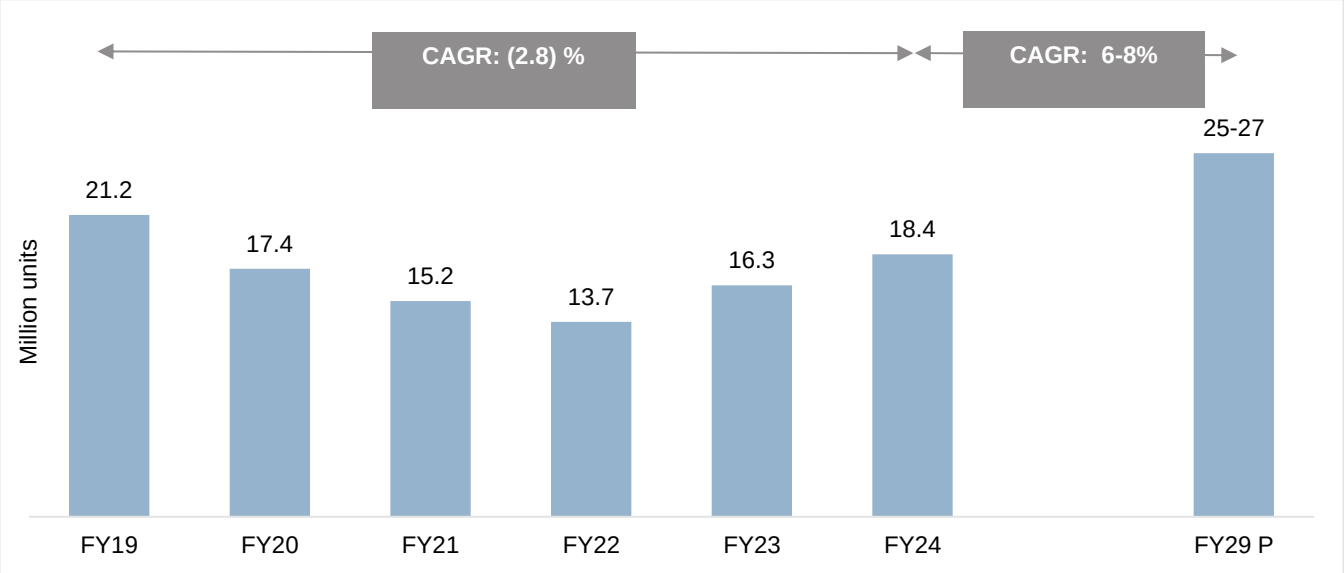
Outlook of Indian two-wheeler industry (fiscal 2024 to 2029)

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 25-27 million by fiscal 2029.

Domestic two-wheeler industry outlook until fiscal 2029



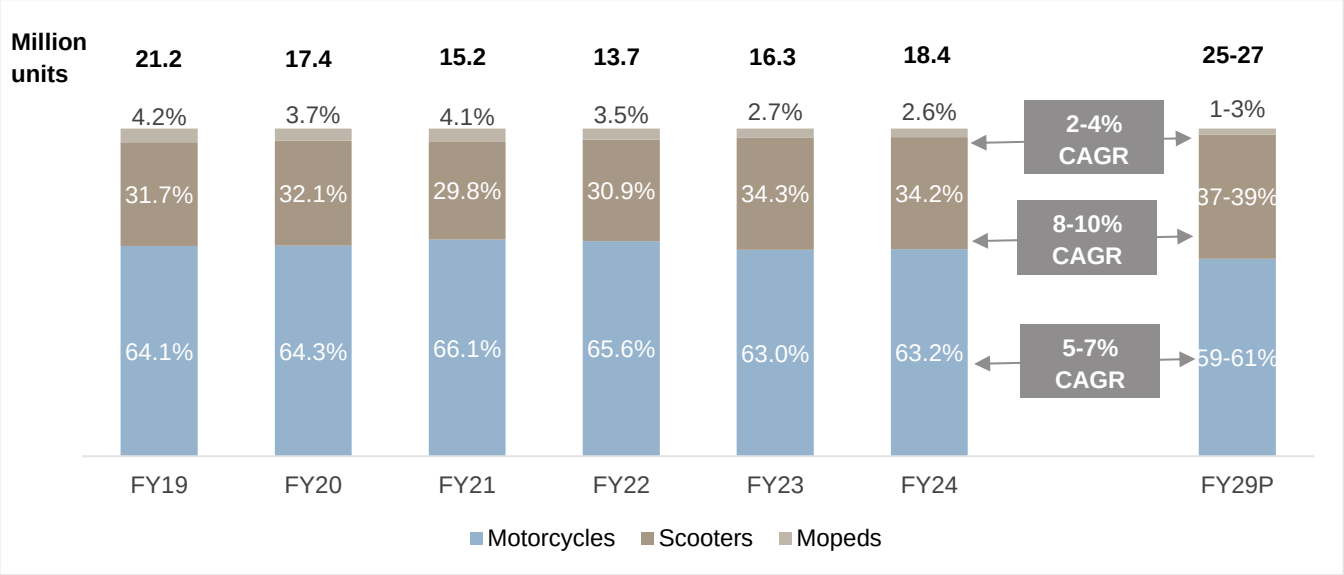
Source: SIAM, CRISIL MI&A

Industry growth will be driven by the EV segment which is projected to clock a healthy CAGR of 40-45% 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.

Going ahead, over the long-term horizon, CRISIL MI&A expects the scooter segment to grow at a much faster pace of 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.

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 6-7% CAGR over the long-term horizon- till fiscal 2029. The primary contributor to motorcycle sales, the ICE motorcycles are expected to grow at 5-7% CAGR. The premium motorcycles subsegment is expected to continue to provide the thrust to the motorcycles segment going ahead while the commuter segment is projected to grow at only a moderate pace.

Premiumization and upgradation will limit the growth of commuter motorcycles subsegment. Shifting customer preference towards premium segments supplemented by OE focus and higher number launches in the premium segment will provide the thrust to the premium segment going ahead.

The moped segment is 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-FY29P CAGR
Motorcycles	**(3.0) %**	**6-7%**
ICE	(3.1) %	5-7%
EV	NM	100-110%
Scooters	**(1.3) %**	**11-12%**
ICE	(4.3) %	(10)-(8) %

Segment	FY19-FY24 CAGR	FY24-FY29P CAGR
EV	101.3%	41- 43%
Mopeds	**(11.4) %**	**8-9%**
ICE	(11.4) %	(20.1) %
EV	NM	NM
Total	**(2.8) %**	**7.5-9.5%**

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 CONSULTING

Upcoming launches in ICE segment

OEM	Vehicle	Segment	Tentative Launch
Bajaj	CNG bikes	Commuter and Premium Motorcycles	2024
	Pulsar N 125	Premium Motorcycle	2024
	Pulsar Adventure	Premium Motorcycle	2025
TVS	TVS ADV	Premium Motorcycle	2024
	Fiero	Commuter Motorcycle	2025
HMCL	Xoom 125R	Premium Scooter	2024
	Xoom 160	Premium Scooter	2024
	Xtreme 200R	Premium Motorcycle	2024
	Xtreme 210R	Premium Motorcycle	2024
	Mavrick 440 Scrambler	Premium Motorcycle	2024
	Adventure Scooter	Premium Scooter	2024
	Xpulse 400	Premium Motorcycle	2025
	Xtreme 400S	Premium Motorcycle	2025
HMSI	PCX160	Premium Scooter	2024
	Rebel 1100	Premium Motorcycle	2024
	Rebel 500	Premium Motorcycle	2024
	Activa 7G	Basic Scooter	2024
	CB350 Cruiser	Premium Motorcycle	2024
	CB 1000R	Premium Motorcycle	2024
	CL500 Scrambler	Premium Motorcycle	2024
	MT 09	Premium Motorcycle	2024
	Max 155	Premium Scooter	2024

OEM	Vehicle	Segment	Tentative Launch
Yamaha	XSR 155	Premium Motorcycle	2024
	R7	Premium Motorcycle	2025
Suzuki	GSX S1000	Premium Motorcycle	2025
	GSX R1000	Premium Motorcycle	2025
Royal Enfield	Scram 440	Premium Motorcycle	2024
	Hunter 450	Premium Motorcycle	2024
	Continental GT 650	Premium Motorcycle	2024
	Shotgun350	Premium Motorcycle	2024

Note: Based on information in secondary sources

Source: Industry, News Reports

Upcoming launches in EV segment

OEM	Vehicle	Segment	Tentative Launch
HMSI	Activa	Scooter	2024
	PCX	Scooter	2024
TVS	iQube update	Scooter	2024
	Creon	Scooter	2025
Suzuki	Burgman	Scooter	2024
HMCL	eMaestro	Scooter	2024
Bajaj Chetak	Vector	Scooter	NA
Yamaha	Neo's	Scooter	2024
Vespa	Electtrica	Scooter	2024
OLA	Adventure	Motorcycle	2024
	Cruiser	Motorcycle	2024
	Diamond Head	Motorcycle	2024
	Roadster	Motorcycle	2024
Ather	Diesel	Scooter	2024
Ampere	NXG	Scooter	2024
LML	Star	Scooter	2024
Tork	Electric Scooter	Scooter	2024
Hero Electric	AE8	Scooter	2024

Note: Based on information in secondary sources

Source: Industry, News Reports

Review of Indian two-wheeler 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.

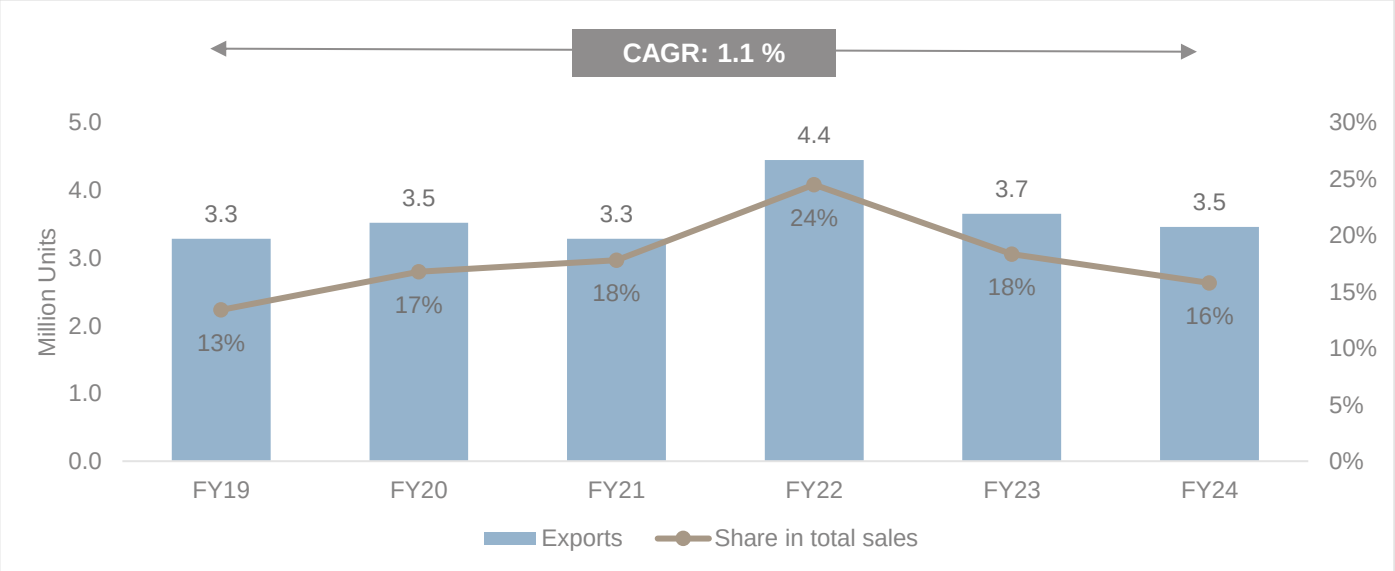
Growth in exports was led by increase in global demand as well as geographical expansion by players like Bajaj and TVS. Also, joint ventures with global brands—such as KTM, Husqvarna and BMW—and catering to the global demand of these brands from India has given an additional thrust to two-wheeler exports.

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 CONSULTING

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).

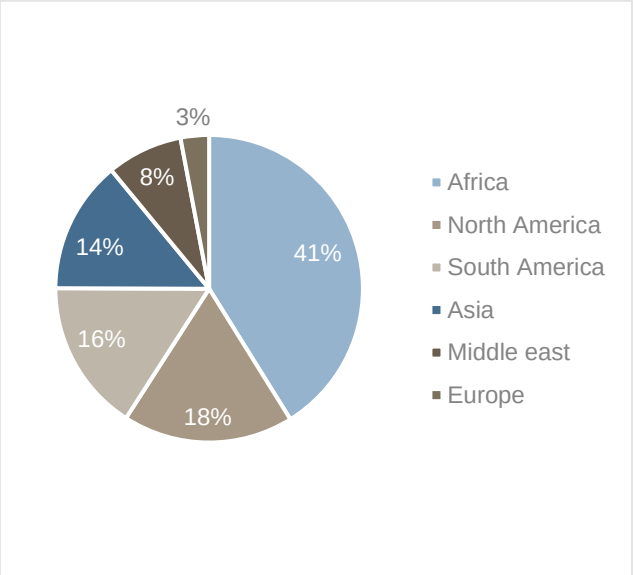
Increased exports to North American countries (6% y-o-y increase in share), primarily Mexico, has lent some support to exports during fiscal 2024. Increase in exports to Turkey aided the share of Middle East during the year. Given the FTAs with Middle Eastern countries like Saudi Arabia and UAE, the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



Country	Share in fiscal 2024 YTD
Nigeria	13.6%
Mexico	8.1%
Columbia	7.7%
Guatemala	4.9%
Uganda	4.8%
Guinea	4.6%
Philippines	4.5%
Turkey	4.4%
Tanzania	4.0%
Nepal	3.7%

Note: YTD: Apr 2023-Feb 2024
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.

Segment wise exports trend

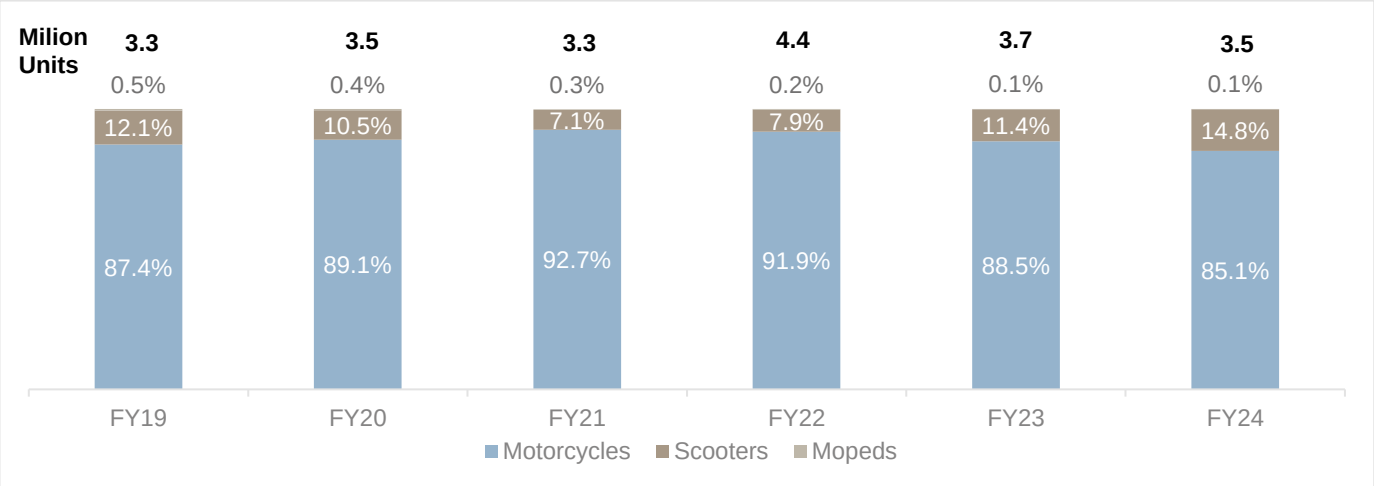
Motorcycles dominate the exports segment as well with more than 85% share in overall exports. However, they lost some ground to scooters, especially in the last 3 years.

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 Southeast 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 CONSULTING

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 and Navi models and added support from recently launched Dio125.

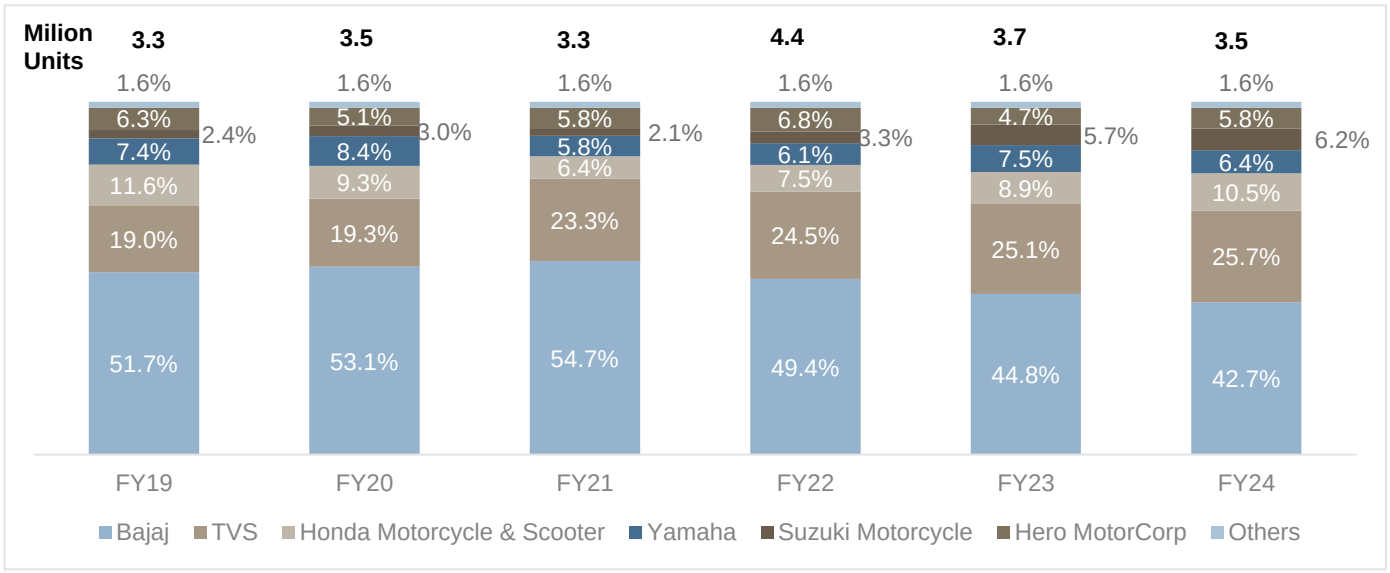
Increased traction for its premium scooters of Burgman and Avenis backed Suzuki's expansion in scooter exports and thus aiding its share expansion in overall two-wheeler exports as well. Moreover, Gixxer and Vstrom helped increased motorcycles exports for the company.

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.

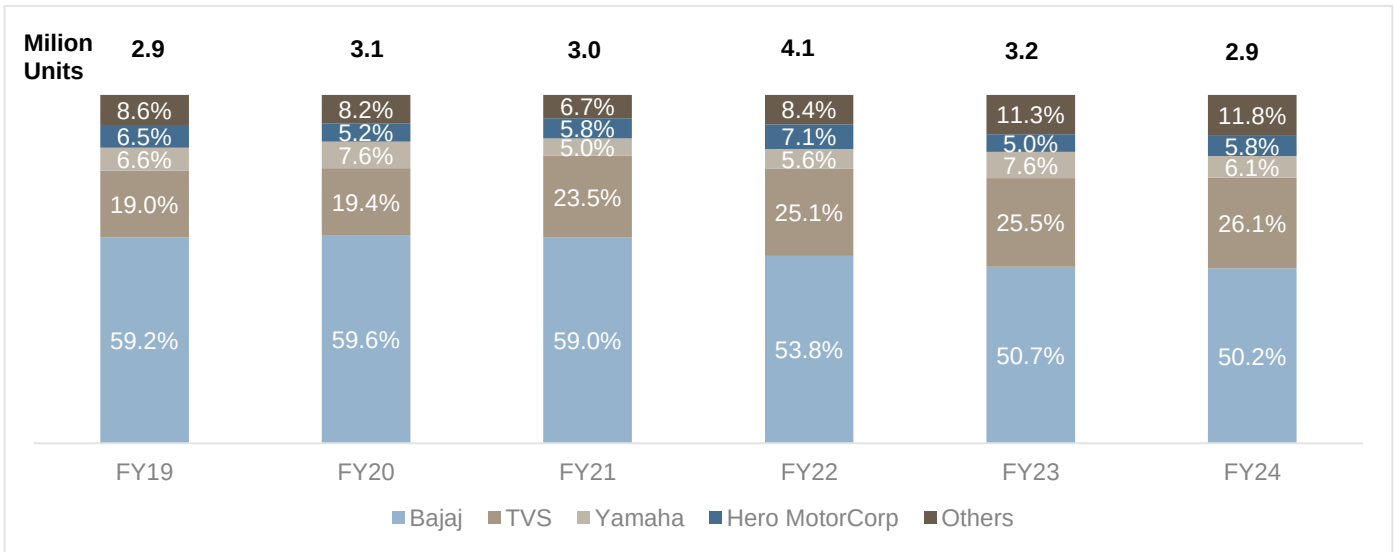
Contribution of HMCL is limited in the exports market and has remained near steady in 5-6% range.

OEM wise share in two-wheeler exports



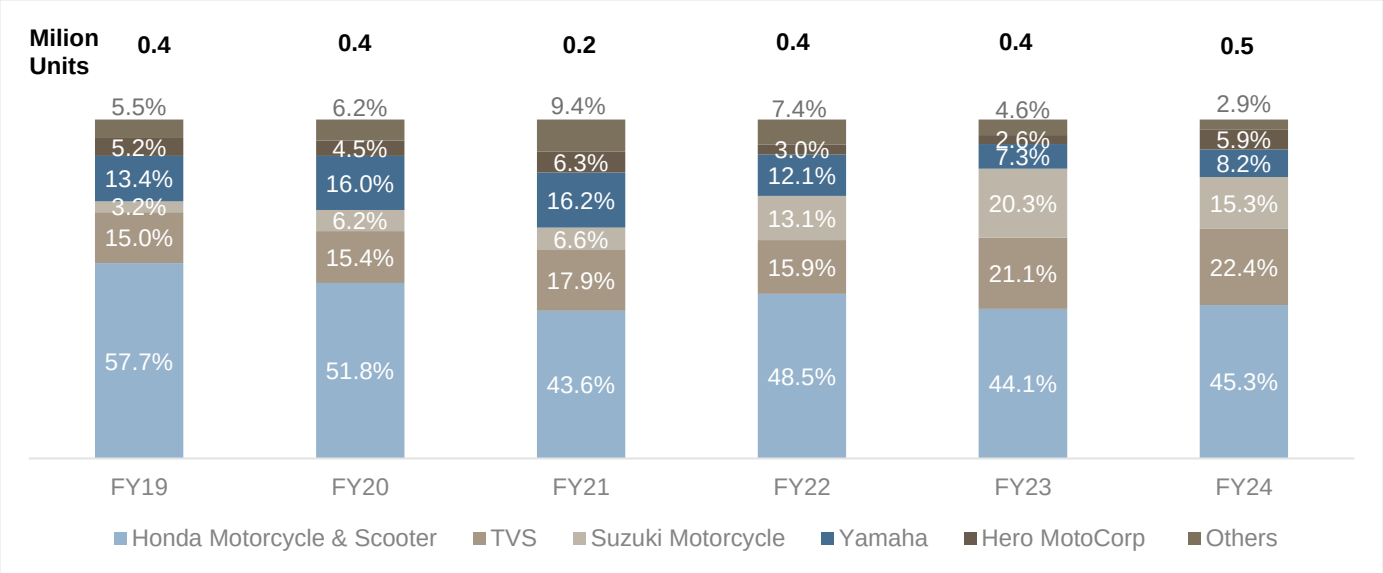
Source: SIAM, CRISIL MI&A CONSULTING

OEM wise share in Motorcycle exports



Source: SIAM, CRISIL MI&A CONSULTING

OEM wise share in Scooter exports



Source: SIAM, CRISIL MI&A CONSULTING

Outlook of Indian two-wheeler exports

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, sharp rise in EV portfolio.

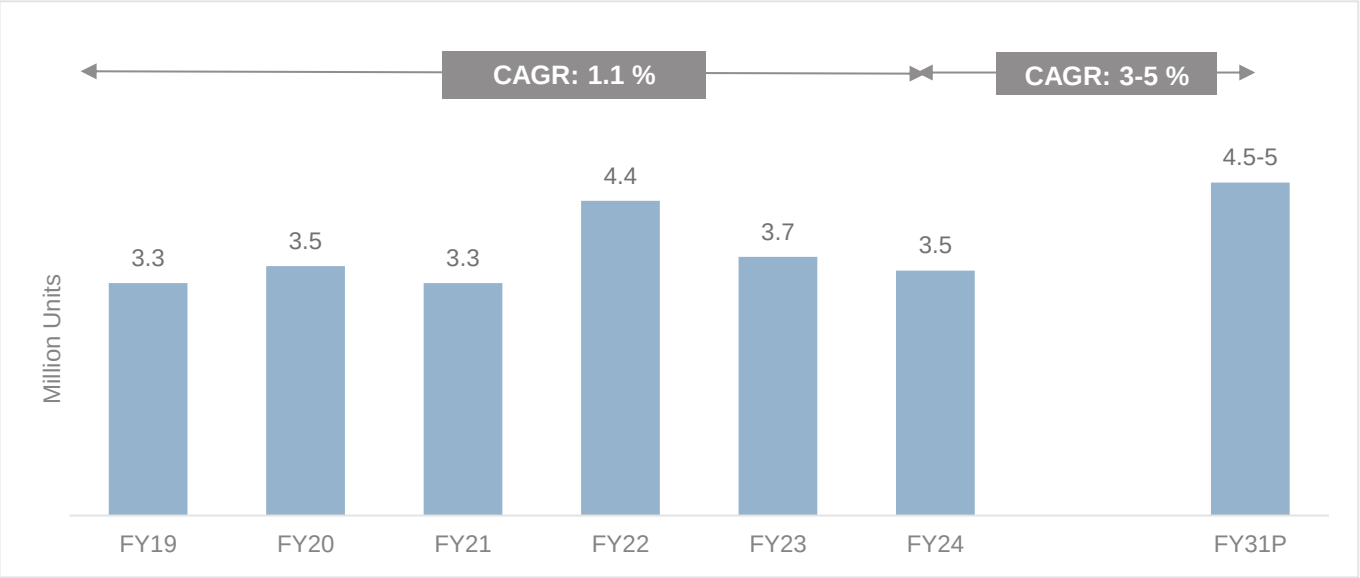
India being one of the largest two-wheeler domestic markets globally, has a unique opportunity to leverage its domestic market scale and manufacturing competitiveness to produce 2W EVnot just for the domestic market but also for the exports markets. Further, policies including PLI are offering a momentum 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 CONSULTING

Free Trade Agreement (FTA) scenario/current tariff with respect to automobile exports

To expand the exports markets while ensuring access to raw materials and capital goods necessary to accelerate domestic manufacturing, India engages in regional and bilateral trade negotiations. Currently, India has favourable market access and economic cooperation with more than 50 countries through multiple trade agreements. FTA is aimed at eliminating or lowering the trade barriers for Indian exporters, so that they could gain a competitive advantage in the foreign markets, paving the way for increased sales and market share. FTA allows exporters access to overseas market at low customs duties or any other taxes. Further such agreements offer a conducive environment for automakers and suppliers in terms of technical collaboration, investments and knowledge sharing that could augment the industry's overall performance and growth.

The following table lists few trade agreements that India has signed and implemented.

Agreement	Enforced Date	Member country	Agreement type	Benefit for automotive industry	Description
Comprehensive Economic Partnership Agreement	1 May 2022	UAE	FTA	Zero-duty market access	Passenger vehicles, including two-wheelers, three wheelers, personal type vehicle and few automotive components are going to get duty free market access in the UAE.
Economic Cooperation and Trade Agreement	29 December 2022	Australia	FTA	Zero customs duty	Passenger vehicles and associated components shall be exempt from the customs duties offering preferential market access

Agreement	Enforced Date	Member country	Agreement type	Benefit for automotive industry	Description
Trade and Economic Partnership Agreement	10 March 2024	Iceland, Liechtenstein, Norway, and Switzerland	FTA	Zero customs duty	Vehicles other than railway or tramway rollingstock, and parts and accessories are exempt from the customs duty
Comprehensive Economic Partnership Agreement	1 January 2010	South Korea	FTA	NA	Motor cars and automotive components are exempt from the obligation of tariff reduction or elimination
Malaysia-India Comprehensive Economic Cooperation Agreement	1 July 2011	Malaysia	FTA	Tariff reduction	Motorcycles get market access and tariffs are reduced to certain pre-determined levels
ASEAN-India Free Trade Agreement	1 January 2010	Brunei, Burma, Cambodia, Indonesia, Laos, Malaysia, Philippines, Singapore, Thailand, Vietnam	FTA	Reduction in tariff	• Indonesia, Cambodia planned to reduce import duties on passenger vehicles. • Brunei reduced custom duties and passenger vehicles are going to get duty free market access. • Malaysia, Vietnam, Myanmar, Laos, Philippines, and Thailand have passenger vehicles in EL (Exclusion List) where no concession is granted, however EL is subjected to annual tariff review with a view to improving market access.

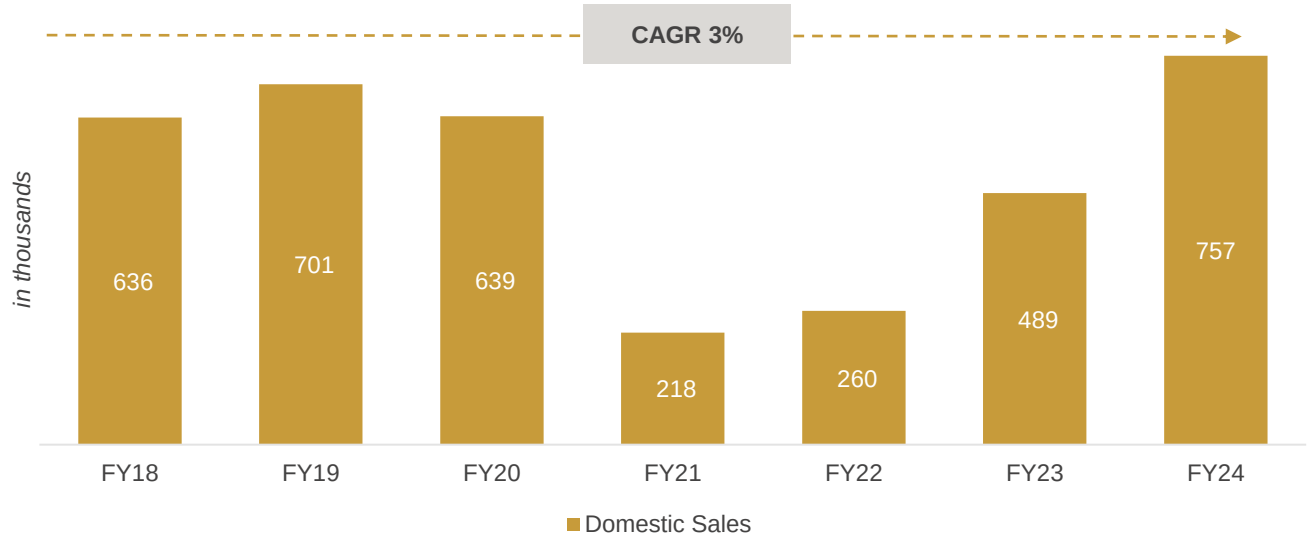
India's FTAs can drastically reshape the duty scenario while offering exporters an improved access in the overseas markets through various mechanisms including duty elimination/concession. Apart from that most favoured nation (MFN) status of India with developed/developing nations could bring trade advantages to India in the form of low tariffs or high import quotas.

4. Review and outlook of Indian three-wheeler industry

Review of Indian three-wheeler industry (fiscal 2019 to 2024)

India is the largest three-wheeler (3W) market in the world, with domestic sales of 0.75 million units in fiscal 2024. The industry contributed to ~2% of the total market – comprising two-wheelers (2Ws), 3Ws, passenger vehicles (PVs) and commercial vehicles (CVs) by volume.

Three-wheelers domestic, by volume

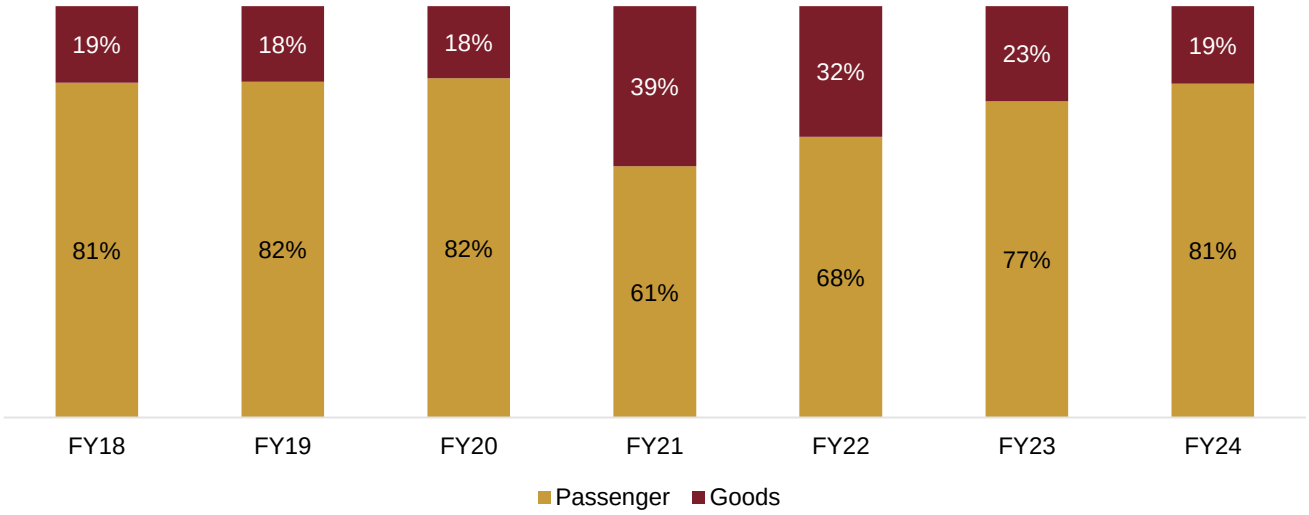


Source: SIAM, Vahan, CRISIL MI&A

Note: ICE numbers have been taken from SIAM while EV numbers have been taken from Vahan

In fiscal 2024, 3Ws domestic sales recorded a substantial on-year growth of 55% in fiscal 2024, led by Passenger vehicles.

Segment-wise share, total volume



Source: SIAM, CRISIL MI&A

3W segment is categorized into two sub segments, i.e., Passenger vehicle (PV) and Cargo/ Goods vehicle (GV). The passenger vehicle segment contributed the majority share to overall domestic sales of 3Ws, accounting for 81% in fiscal 2024. A significant decline was witnessed in fiscal 2021 in PVs due to the Covid pandemic and the BS-VI transition. The pandemic shored up preference for personal mobility and leading to a sharp decline in shared mobility. However, there has been a slight recovery from fiscal 2022 as demand for shared mobility gradually increased.

The Goods segment accounted for 19% share in fiscal 2024 on a high base of fiscal 2023. The Goods segment contributed the highest 39% in 2021 with robust demand for last-mile delivery, particularly in urban areas. Electric mobility has been making strong presence on the back of a steady pick-up in last-mile connectivity demand and cargo requirement. Electric GV constitutes 28% of total GV sales in 2024, compared with 16% in 2023. The continuous growth shows immense potential, particularly in the electrification of 3Ws.

Demand drivers

Easier availability of finance

Stringent credit norms and credit information through the Credit Information Bureau (India) Ltd (CIBIL) have helped players widen their customer base. Moreover, the entry of NBFCs targeting the markets banks and captive NBFCs (operated by two-wheeler manufacturers) had exited, with focus largely on non-metros, have fuelled competition.

Sales growth in the domestic 3Ws industry was accelerated by financial incentives, such as subsidies, interest on subvention on loans, and hire-purchase schemes, tax benefit as an incentive to scrapping an old vehicle (unfit vehicle) along with the offering of the permit-exchange system at no additional cost, easier availability of finance, low interest rates, and higher funding provided by various banks and NBFC.

Stable agricultural output

The performance of the agriculture sector has been impressive over the past few years. Gross value added (GVA) in agriculture grew 4% in fiscal 2023, compared with 3.5% in fiscal 2022. The sector contributes 15% in the total GVA, and it was 12.7% before pandemic. The sector has registered an average annual growth of 4% between fiscal 2018 to fiscal 2023. During the pandemic, the agriculture sector grew by 3.3% in fiscal 2021 and 3.5% in 2022.

Institutional credit flow to agriculture and allied sectors grew at a compound annual rate (CAGR) of 14.8% between fiscals 2019 to fiscal 2023. Rabi output was favourable in fiscal 2023, supporting farmer incomes during the early months of fiscal 2024. In the current fiscal, kharif sowing was initially delayed due to a delayed monsoon. However, sowing has picked up in recent months. Moreover, higher Minimum Support Price (MSP) allocation for fiscal 2024 and good prices in mandis have maintained the positivity on ground.

The rainfall progress and distribution of rainfall in different regions should play a key role for the current kharif cycle. The progress of the monsoon and its impact on rural demand, remain key monitorable.

Steady growth in industrial GVA

The industry holds a prominent position in the Indian economy, constituting 30% of total GVA. In fiscal 2023, the industry sector grew 4.4%, compared with a strong growth of 11.6% in fiscal 2022. From the low base of fiscal 2021, industrial GVA bounced back rapidly in fiscal 2022.

The industry GVA grew at a tepid pace of 3.7% between fiscals 2018 and 2023. After ~5% growth in fiscal 2019, it contracted over the next two years, amid an unfavourable macroeconomic scenario and the Covid pandemic.

Increase in investment demand has emerged as another powerful stimulus to industrial growth, as there was a significant jump in the Central government capex in the current and previous years compared with pre-pandemic year. Industry GVA is expected to be robust, driven by the government’s focus on 'Make in India'. Moreover, improvement in infrastructure and higher expected corporate expenditure are likely to support the capex cycle after fiscal 2023.

Growth in e-commerce

The size of the Indian e-commerce industry was estimated at ~Rs 3,100 billion in fiscal 2023, has been phenomenal growth, barring in fiscal 2021 when it was weighed down by the pandemic .The market has managed to attract not only customers but also global investors, and has grown three times between fiscal 2018 and 2023 due to the deepening internet penetration, rising awareness about online shopping, and lucrative deals offered by well-established players and start-ups.

Online retail’s share of the total size of the domestic e-commerce industry was 70% in fiscal 2023. Investment by major retailers, discounts offered by players, advertising and supply-chain expansion increased the demand in online retail during the past three fiscals, leading to a CAGR of ~20% between fiscals 2020 and 2023.

Apparel and consumer electronics segments found a foothold in the ecommerce space very early and have been growing continuously – in fact these segments are expected to form the major chunk, with grocery expected to grow at a much faster pace and raise its overall share in e-retail space.

CRISIL MI&A research believes that online grocery will be one of the fastest-growing segments in the e-commerce space, reaching around 2.5 times its current market size over the next three years. Growth will largely come from metropolitan and tier-1 cities, where penetration is still very low.

According to the Society of Indian Automobile Manufacture (SIAM), in fiscal 2024, around 35,192, electric 3Ws were sold domestically, as compared with 30,134 in fiscal 2023, due to robust growth in demand. There is a vast mobility-solution opportunity using EVs in the middle- and last-mile connectivity, with the 3Ws as delivery vectors. Electric 3Ws provide an essential element of this supply chain.

Other factors driving growth

- Ban on permits for diesel vehicles by a few top states in 3W sales
- Favourable cost economics, strong charging infrastructure, easy availability of finance should drive the growth of e-autos
- E-retail is currently an important segment in e-auto sales. An improving economy amid low-to-moderate inflation is expected to drive consumer spending in propelling retail-industry growth in, driving the sales of e-autos even further.
- A stronger infrastructure network (metro lines and road connectivity) and the need for zero-emission 3Ws for last-mile connectivity.

Electrification in 3Ws

With the emphasis on reducing the carbon footprint, electric vehicles (EVs) are gaining importance globally. India is also a signatory to the Paris Agreement under the United Nations Framework Convention on Climate Change. The country is also part of the EV30@30 campaign, targeting a 30% sales share for EVs by 2030.

The government is extending its support via Faster Adoption and Manufacturing of Hybrid and Electric vehicles (FAME) and tax-rate cuts to boost EV adoption. Furthermore, growing awareness, concern for environmental issues, and keener focus from automotive companies are driving electrification in India. The EV segment received a real thrust in the past two years with model launches, increasing awareness, elevated fuel prices, and improvement in infrastructure support.

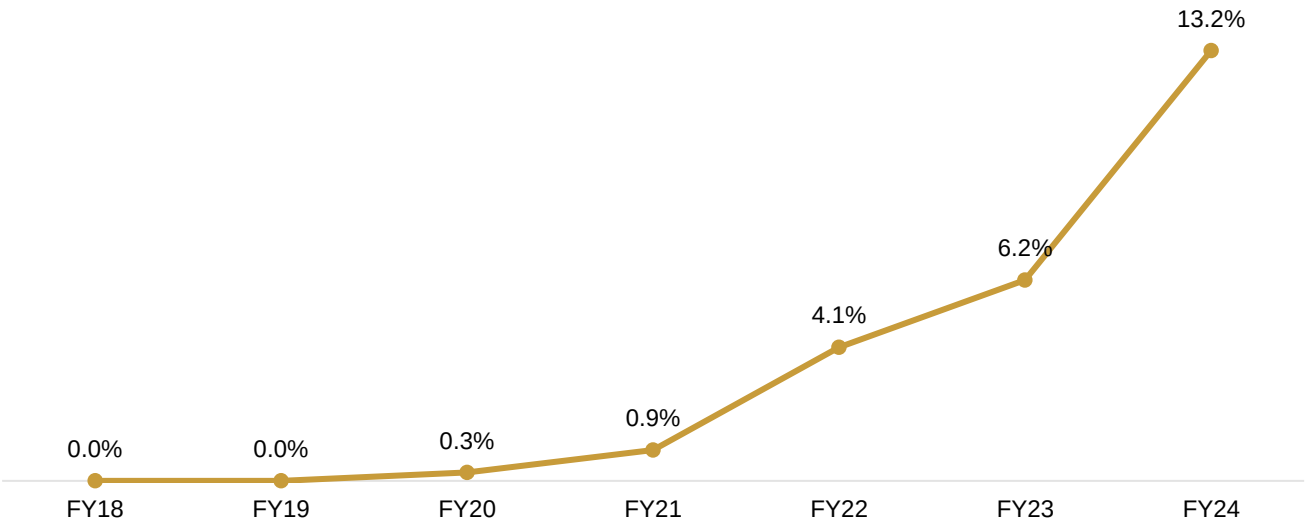
The government announced Rs 100 billion for Phase II of FAME, which commenced on April 1, 2019. This phase mainly focuses on supporting electrification of public and shared transportation and aims to support through demand incentives 0.5 million electric 3Ws. The policy aims to provide a subsidy of Rs 10,000 per kWh to three wheelers. It envisions the creation of infrastructure for EV charging. The subsidy for two-wheelers is Rs 15,000 per kWh, although it was cut from June 2023, by lowering the cap on maximum subsidy from 40% of a vehicle’s ex showroom cost to 15%. EV adoption has been relatively fast in the two- and three-wheeler segments. A sharp rise in fuel costs in the past two years provided an added incentive to the price-sensitive customers of two- and three-wheelers. Moreover, a bevy of vehicle launches from the industry backed the growth in adoption, especially in fiscal 2023.

Sales of e-3Ws (L3 and L5) in India

In the e-3W segment, mobility, especially in the case of e-rickshaws, is widely used for last-mile connectivity. E-autos and e-rikshaws differ primarily in the design specification of electric powertrain, performance (in terms of torque and maximum speed) and passenger capacity. E-rikshaws are a low-cost variant of e-3Ws, without an exact Internal Combustion Engine (ICE) counterpart.

The overall e-3W market has grown at a significant 33% CAGR between fiscal 2018 and fiscal 2023. The e-3Ws with high assured utilisation rates are more profitable for businesses, as they become economical to operate at higher utilisation. E-commerce giants are preferring e-rikshaws for clean and economical last-mile connectivity.

EV penetration in 3Ws (L5 category)



Note: Electric 3W includes e-auto
Source: VAHAN, CRISIL MI&A

E-auto (i.e., the L5 category) rickshaws use lithium-ion batteries and have an average speed of more than 25 kmph. They are used for moving cargo as well as passengers. The leading players in this segment present in this space Mahindra Electric and Piaggio. Under FAME-I, e-3Ws driven by lead-acid batteries were also eligible for the subsidy. However, under FAME-II, only advanced batteries and registered vehicles are eligible. Higher initial cost of e-autos, lack of availability of a wide range of products in the market, and low availability of charging infrastructure have posed challenges to their penetration

Despite these challenges, the shift towards e-autos occurred due to low cost, economical, and environmental cleanliness.

Drivers for electrification

Total cost of ownership (TCO)

TCO for 3Ws in FY24 for four-year ownership

Annual running	30,000 km	35,000 km	40,000 km
Petrol-equivalent 3W EV	37% lower cost than petrol	42% lower cost than petrol	45% lower cost than petrol
CNG-equivalent 3W EV	33% lower cost than CNG	37% lower cost than CNG	41% lower cost than CNG

TCO for 3W in FY29 for a four-year ownership

Annual running	30,000 km	35,000 km	40,000 km
Petrol-equivalent 3W EV	43% lower cost than petrol	48% lower cost than petrol	50% lower cost than petrol
CNG-equivalent 3W EV	40% lower cost than CNG	44% lower cost than CNG	47% lower cost than CNG

Note: Total cost of ownership analysis framework takes into consideration down payment/ initial payment, Incentive/subsidies, EMI, fuel cost, maintenance cost and battery replacement cost if any over the ownership period adjusted for the resale value
Source: Industry, CRISIL MI&A

The TCO for an electric 3W is 37% lower than that of a petrol 3W and 33% lower than that of a CNG 3W for 30,000km in fiscal 2024. This is expected to be 43% lower versus petrol and 40% lower versus CNG in 2029 for the same distance, highlighting the viability of electric 3Ws for a typical commercial application. Additionally, the TCO per km of an e-auto become even more economical, because of the subsidies for e-autos.

Unlike ICE vehicles, e-3W passenger vehicles do not fall under the ambit of the permit system, leading to a shift in the customer preference towards e-3Ws. We expect the launch of new products by players in this category to drive 3W sales. Incentives declared in the FAME II and state EV policies are also anticipated to be key drivers.

Government's FAME policy to promote EVs

Under the government's push for the use of EV in the country, the National Mission on Electric Mobility was approved in 2011 and its plan, called the National Electric Mobility Mission Plan (NEMMP 2020), was released in 2013. In April 2015, the Faster Adoption of Manufacturing of (Hybrid and) Electric Vehicles in India (FAME India) was launched as a part of the mission. The first phase of FAME scheme continued until March 31, 2019, and the second phase, termed as FAME-II, was launched on April 1, 2019. FAME-II aims to strengthen the EV manufacturing ecosystem in the country through demand incentives and the establishment of a network of charging stations.

Incentive structure under FAME II

Maximum no. of vehicles to be supported	Approx. size of battery in KwH	Incentive (Rs/ KwH)	Maximum incentive (Rs)	Max ex factory price to avail incentive (Rs.)	Total fund supported (Rs Cr)
500,000	5	10,000	20% of cost of vehicle	500,000	2500

Source: Department of Heavy Industries (DHI), CRISIL MI&A

FAME II versus FAME I

	FAME II		FAME I	
	Approx. Incentive	Max ex-factory price(Rs lakh)	Incentive L1 (Rs)	Incentive L2 (Rs)
Registered 3W	40,000-62,000	5	45,000	54,000

Source: Department of Heavy Industries (DHI), CRISIL MI&A

Ministry of Heavy Industries also announced Electric Mobility Promotion Scheme 2024 with a total outlay of Rs. 500 crore scheme to be implemented from 1st April to 31st July 2024. The EMPS scheme to be applicable on 2W EV and three-wheeler (e-3W) to provide further impetus to green mobility and promote electric vehicle manufacturing in the Country.

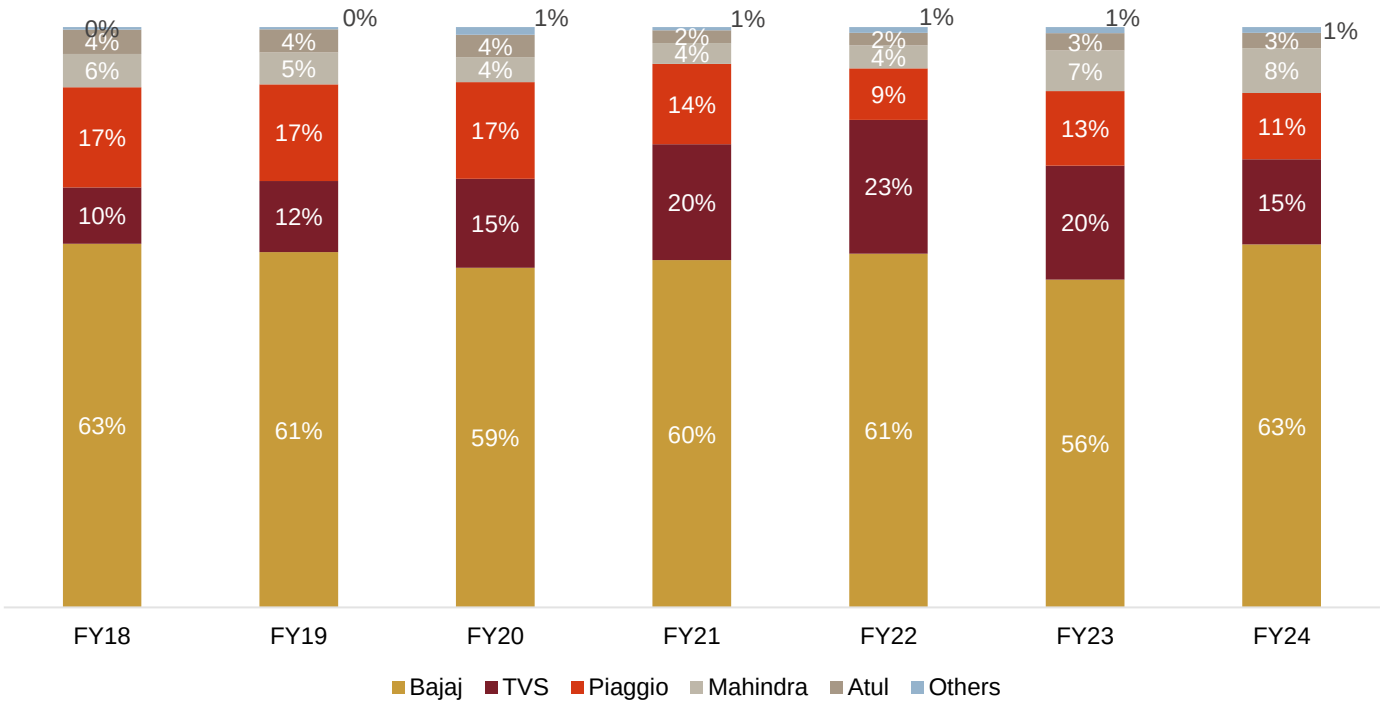
Replacement opportunity in three-wheelers

Demand for 3Ws has improved after the pandemic subsided as customers are upgrading and replacing old fleet for higher uptime and cleaner vehicles. The replacement market for 3Ws has expanded. Pent-up demand from fiscal 2021 (when vehicular moment was restricted) had helped the segment last fiscal. It is expected to continue this fiscal,

too. Further, demand in the replacement market is expected to grow owing to deeper penetration of electric three-wheelers. Additionally, central and state subsidies have lowered the capital cost. Also, some of the states have either reduced or waived of registration fees, road tax and permit requirement for electric three-wheelers. Moreover, these vehicles have inherently lower running cost. Overall, their cost of ownership is now much lower than conventional diesel or CNG three-wheelers, rendering shift to electric 3Ws attractive.

Bajaj leads three-wheelers

Share of key player in three-wheelers (Basis Production)

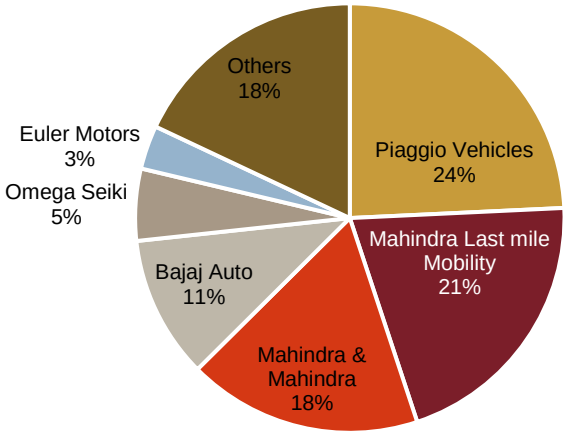


Note: Electric 3Ws include e-auto (L5 category)
Source: SIAM, CRISIL MI&A

Competition in the three-wheeler industry is reasonably consolidated, with Bajaj dominating over the past five years. The key players are Bajaj, TVS, Piaggio, Mahindra and Atul (together more than 90% of the market). While Piaggio is a strong player in the goods segment, Bajaj is way ahead of the competition in the passenger segment.

Piaggio, Mahindra top electric three-wheeler segment

Market share of key players in electric 3Ws (e-autos, FY24)



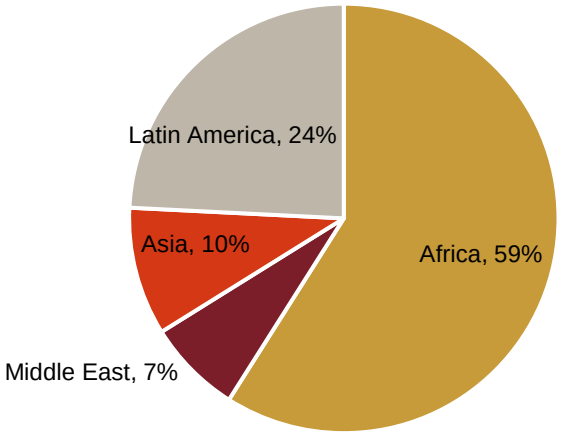
Note: Electric 3Ws do not include e-rickshaws
Source: Vahan, CRISIL MI&A

Mahindra Last Mile Mobility and Piaggio were the top two players in fiscal 2024, together accounting for over 45% of the market in the electric three-wheeler segment. They witnessed strong growth in sales in 2024 as three-wheeler operators looking to lower their operating costs amid high fuel prices seem to have switched to electric variants.

Electric 3Ws use lithium-ion batteries and can go above 25 kmph. They are used for cargo as well as passenger movement. There are only very few players, such as Mahindra Last Mile Mobility and Piaggio, in the space. Under FAME-I, lead acid battery-driven electric 3Ws were also eligible for the subsidy. However, under FAME-II, only advanced batteries and registered vehicles are eligible. Higher initial cost of e-autos, lack of availability of wide range of products in the market and poor charging infrastructure availability have posed challenges to their penetration.

Despite these challenges, lower operating cost and environmental friendliness of these vehicles have supported the shift towards e-autos. Unlike ICE vehicles, electric three-wheeler passenger vehicles do not come under the ambit of the permit system because of which customers prefer them. As more players launch products in this category, we expect it to drive three-wheeler sales in general. Incentives under the FAME II and state EV policies are also expected to support.

Key three-wheeler export markets (FY23)



Source: Directorate General of Foreign Trade, CRISIL MI&A

Last fiscal, exports to Africa amounted to 137,190 units, Middle East 16,630 units, Latin America 56,290 units and other Asian countries 22,460.

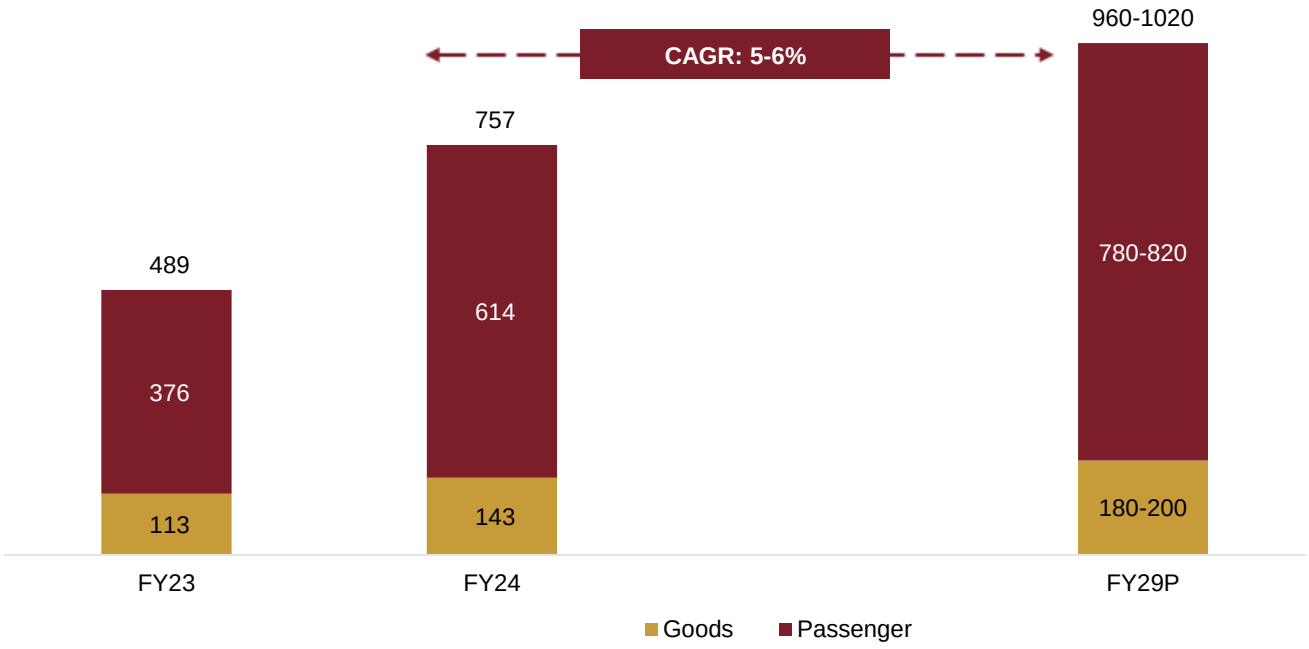
Share of exports to Latin America rose led by increased exports to Mexico, Peru, Ecuador and Peru. Currency devaluation, demonetisation and elections adversely impacted the exports to Africa. Exports to Asian countries also declined, led by Bangladesh, Nepal and Indonesia.

Outlook of Indian three-wheeler industry (fiscal 2024 to 2029)

Domestic sales

The domestic three-wheeler market grew phenomenally last fiscal, recording the highest growth of 88% on-year. Electric vehicle penetration has reached to 13.2% in fiscal 2024 The availability of finance, alternative fuels and state subsidies contributed majorly to the growth.

Domestic sales outlook for FY24-29 (in volume terms)



Note: Electric 3Ws do not include e-rickshaws

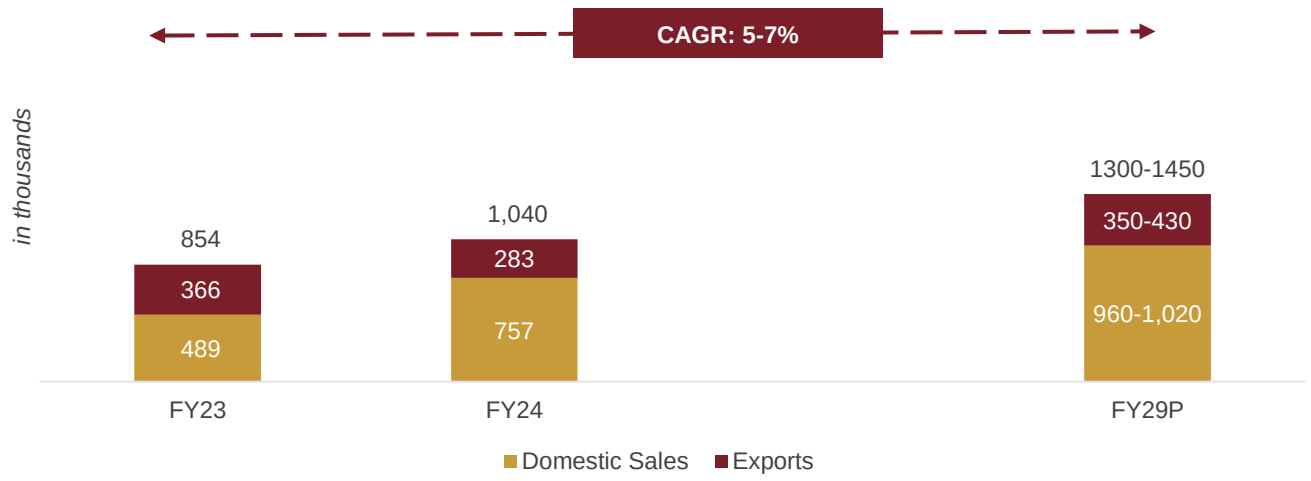
Source: SIAM, Vahan, CRISIL MI&A

Between fiscals 2024 and 2029, domestic 3Ws are projected to record a 5-6% CAGR, led by an 4-6% CAGR in the passenger segment and 5-7% in the goods segment.

Outlook for domestic sales and exports

The overall 3W industry expected to grow by 5-7% CAGR between fiscal 2024 and fiscal 2029.

Outlook for domestic sale, export volumes for 3Ws (FY24-29)



Source: CRISIL MI&A

The passenger segment accounts for around 99% in the overall three-wheeler exports from India in fiscal 2023. The total exports are expected to log a 4-8% CAGR between fiscals 2024 and 2029. Last fiscal, the exports had declined a substantial 27% on-year owing to geopolitical and monetary crises in various countries. Key exporting destinations such as Africa, Middle east, Latin America and Asia are reeling under macroeconomic challenges. Most of the countries have been impacted by high inflation. While in Bangladesh fuel prices have been increased, countries such as Kenya and Nigeria are still seeing the impact of currency devaluation. Also, shipments to Iraq and Sudan have been limited owing to civil strife in these countries. Moreover, the Israel-Hamas war in the Middle East has increased global uncertainties. But the devaluation of currency and availability of foreign exchange remain a major constraint. Overall three-wheeler exports are expected improve this fiscal 2024 but a complete recovery is possible only next fiscal year because of global uncertainties.

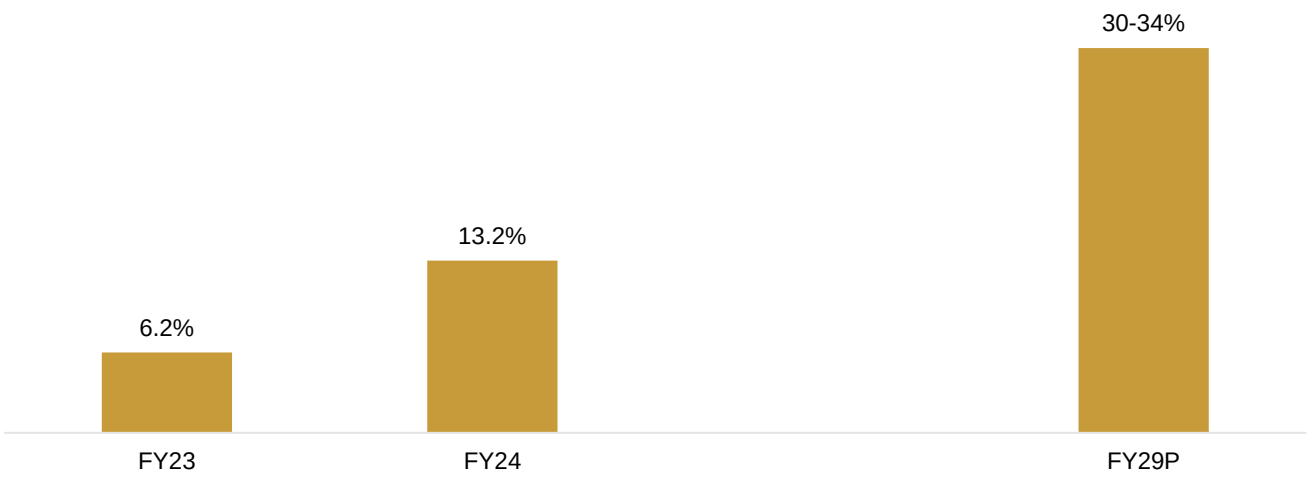
Outlook of electric three-wheeler market in India (fiscal 2024 to 2029)

CRISIL MI&A Consulting expects EV penetration in the three-wheeler segment expected to reach and go above 30-34% by 2029. 3Ws will spearhead the EV penetration in India because they are mostly used for short-distance trips and carry more load than e-rikshaws and e-bikes.

Moreover, all the conventional large OEMs, including Bajaj, Piaggio, Mahindra and TVS, have launched e-autos in the Indian market, which has improved their supply. This is expected to boost EV adoption in the long term.

Share of electric 3Ws to increase (L5 category)

EV penetration outlook for FY24-29



Note: Electric three-wheelers include e-auto

Source: CRISIL MI&A Consulting

The Penetration of electric vehicle in 3W was ~13% in fiscal 2024. However, the shift to electric 3Ws is gaining momentum owing to high prices of diesel, petrol and CNG.

The electric three-wheeler segment will continue to innovate and lead the industry as fixed and swappable battery solutions have revolutionised the sector. Also, leading OEMs are focused on electric three-wheelers. Bajaj currently dominates the petrol segment. Its market share is expected to expand with their aggressive initiative in EVs.

Favourable regulatory environment and the central and state government subsidies are lowering capital costs of buying electric three-wheelers. Also, reduction or waiver of registration fees, road taxes and permit requirement by some of the states continue to support electric vehicle adoption. Moreover, their TCO is 30-40% lower than the conventional diesel or CNG three -wheelers making the conversion to electric autos an attractive proposition.

5. Review and outlook of the Global Off-Highway Vehicles (OHV)

Review and outlook of the global OHV (United States and Europe)

The United States and Europe OHV Market was valued at USD 92.51 billion in 2023 and is projected to grow to USD 132.55 billion by 2029, registering a CAGR of 7.08% in terms of revenue during the forecast period (2024-2029).

The construction industry is expected to be a significant contributor to the economy in the coming decade. The amount of activity in the private construction sector also affects the need for road construction equipment, as private contractors may need heavy machinery for their projects. Economic conditions, population expansion, and overall infrastructure spending all have an impact on the amount of demand for OHV.

Due to the rise in spending by various government authorities in the region on mining and construction activities, OHV manufacturers are facing pressure to switch from traditional hydraulic and mechanical machines to cost-effective electric and hybrid vehicles. This is due to both the demand for more environmentally friendly equipment and regulatory pressures for lower emissions. This growth is expected to continue during the forecasted period.

During the projected time frame, the escalation of infrastructure expansion and progress in the construction industry across nations is expected to amplify the demand for construction equipment. For instance, as per the Federal Transport Infrastructure Plan (FTIP) 2030, the government of Germany has revealed its commitment to allocating a significant investment of USD 147.6 billion towards the development of the country's road infrastructure by 2030. This ambitious investment plan is aimed at enhancing the quality and capacity of Germany's roadways, which will ultimately lead to improved transportation services for the people of Germany.

Based on the machinery type, excavators dominate the market in terms of value and volume in CY2023. A rise in excavation activity across the region is likely to increase the demand for excavators in the coming years. The rise in investment in the real estate segment still offers attractive opportunities for the market during the forecast period. By Drive type, Internal combustion engine hold a major market share in terms of revenue in CY2023. The rise in construction investment across the region is likely to enhance the demand. The enactment of stringent emission norms is likely to increase the demand for electric construction machinery in the coming years.

By Country, Germany witnessing major growth in terms of revenue in CY2023. the rapid increase in migration of people from rural to urban areas has led to increasing investments in the growth of sustainable and smart cities. This has led to the introduction of technologically advanced machines such as backhoe loaders that speed up construction activities.

United Kingdom’s aim of achieving a net-zero carbon economy has led to a rise in construction projects. To reduce carbon emissions, the government has invested in green infrastructure, including renewable energy projects, electric vehicle charging infrastructure, and energy-efficient building renovations.

The market is expected to experience significant growth during the forecast period, due in part to an increase in labour costs. This increase in demand for advanced construction machinery is likely to be a significant driver for the market.

As the number of commercial and residential buildings across the country increases, so does the need for routine maintenance to keep them safe places to live and work. As a result, building owners and contractors spend significant amounts of money on building maintenance as well as remodelling old and underutilized rooms to profit from them. As a result, demand for excavators and loaders is increasing, contributing to overall market growth.

The OHV Market is expected to experience growth in the upcoming years, both in the United States and Europe. This is due to an increase in strategic development between construction machinery manufacturers. With the introduction of new models, including electric and engine-powered machinery, key players are likely to enhance the demand for construction machinery in the coming years. Major players in the market are Caterpillar Inc., Deere and Company, Liebherr AG, SANY Group, and Others.

Market drivers

Growing infrastructural development across the region

United States

The construction industry is a constantly evolving sector, and various factors such as the overall economic growth, budget allocation for construction projects, and the global economic scenario are significantly influencing the market's growth trajectory. These factors are playing a crucial role in shaping the future of the construction industry, and businesses operating in this sector need to remain aware of these trends to stay competitive and relevant in the market.

The United States holds significant opportunities for the growth in demand for construction machinery. With the prospects of large infrastructure projects and shifting labor dynamics, the demand for OHV is expected to witness growth during the forecast period.

Road construction equipment is an essential part of infrastructure development for any country. Government spending on transportation infrastructure projects heavily influences the demand for road OHV in the United States.

Numerous road building and maintenance initiatives are supported by the government nationwide, and these initiatives call for a range of heavy equipment, including bulldozers, rollers, graders, excavators, and asphalt pavers. For instance, o In January 2023, President Biden and Transportation Secretary Pete Buttigieg announced an investment of USD 1.2 billion from the new National Infrastructure Project Assistance (Mega) discretionary grant program for nine projects across the country.

Europe

The growing demand for housing in urban areas, increased infrastructure development activities, and increased modernization and renovation of buildings to increase their energy efficiency are all factors contributing to the growth of the construction market in Europe.

The countries are investing heavily in infrastructure development to combat major issues such as traffic congestion, population growth, high manufacturing costs, and aging transportation infrastructure. Developed economies are investing in technologies such as earthquake-proof buildings, hyperloop, and so on to improve their current infrastructure. These factors are boosting the market’s growth.

According to Germany Rail Transport, rail freight transport will be increased by 25% by 2030 which in turn is likely to surge in demand for wheel loaders and excavators for the construction of railroads. The construction industry contributes more than 9% to the European Union's current GDP. Europe is witnessing a major growth in construction owing to the rapid development of transport infrastructure. Projects such as the London Cross rail (worth more than EUR 17 billion) and Germany and Denmark's Fehmarn Belt Fixed Link which is 18 kilometers long world's longest immersed road and rail tunnel are driving the growth of the market.

The government is spending a huge amount to develop renewable energy production across the region, which in turn is likely to enhance the demand for construction equipment such as excavators and loaders in coming years. For instance,

- In September 2023, The Government of Germany announced an investment of Euro 269.6 Billion (USD 299.6 billion) for the development of transport infrastructure across the country.

- In August 2023, The German cabinet announced an investment of USD 63.2 Billion (Euro 57.6 Billion) for the development of renewable energy infrastructure such as e-mobility charging infrastructure across the country.

During 2023, Spain announced the investment of 7% more in infrastructure, totalling 11.794 billion Euros (USD 12.63 billion), according to the proposed general state budget. Nearly half of this, or 5.4 billion Euros (USD 5.78 billion), will go to the rail industry. The Spanish railways' manager, ADIF (Administrador de Infraestructuras Ferroviarias), will receive 2.807 million Euros (USD 3 million). Of these, 259 million Euros (USD 277.35 million) will go into administration, and 932 million Euros (USD 998 million) will be used to finance network upgrades or new investments. EUR 720 million (USD 771 million) will come from European funds.

- In September 2022, a study by Italy's state-owned export credit agency SACE projected that over the next ten years, the entire investment in Italy's infrastructure will amount to nearly Euros 100 billion (USD 107.08 billion).

- In July 2022, the European Investment Bank (EIB), as part of a consortium of more than 20 international banks, announced to finance the first-ever energy link connecting Germany and the United Kingdom. This interconnector will cost 2.8 billion Euros (USD 3 billion) to build, of which 400 million Euros (USD 428.34 million) will be provided by the EIB to finance the European portion. The interconnector will contribute to the integration of high proportions of intermittent renewables across the North Sea and facilitate electricity trading between the European Union and the United Kingdom.

With the above-mentioned development across the region the demand for OHV such as Excavators and Loaders is likely to grow during the forecast period.

Growing electrification of product to drive the market

OHV manufacturers are under pressure to choose electric and hybrid vehicles over traditional hydraulic and mechanical ones due to the demand for cost-effective machines and regulatory pressures for lower emissions. As a result, the electrification of OHV is gaining momentum.

With the rise in construction activity, there has been an increase in diesel consumption. However, diesel combustion emits harmful exhaust into the environment, despite having a higher energy density than gasoline. To counteract this, governments and pollution control agencies have put in place regulations that require diesel engines to emit only minimal amounts of NOx and SOx emissions.

OHV powered by electricity produces zero emissions, minimal heat, noise, and vibrations. This has led to manufacturers considering hybrid and all-electric vehicles for the future.

Major OHV manufacturers are introducing new models of electric excavators and loaders in the region, fuelling the growth of the market. For instance, o In September 2023, LiuGong introduced a new 21-tonne electric wheeled loader in the European region. The electric wheel loader is equipped with a 423kWh large capacity lithium iron phosphate battery.

1. In July 2023, Komatsu Ltd introduced the PC33E-6 a new 3-ton class electric mini excavator in Europe. The new electric excavator is equipped with a lithium-ion battery having 35kWh capacity.
2. In June 2023 -
    a. Volvo Construction Equipment Ltd.'s first mid-size electric excavator, the EC230 Electric in the European region. The EC230 excavator is equipped with lithium-ion battery.

   b. J C Bamford Excavators Ltd. Introduced a full electric wheeled loader in Europe. The electric wheel loader is equipped with a 20kWh lithium-ion battery pack.
3. In May 2023, Volvo Construction Equipment launched its latest innovation, the EC230 Electric Excavator, in the United States. This state-of-the-art equipment is designed to offer exceptional performance and efficiency for all your excavation needs. With its advanced electric motor technology, the excavator delivers powerful and smooth operation while being environmentally friendly, emitting zero emissions. The introduction of this excavator is a significant milestone in the construction industry, and it is set to revolutionize the way construction work is done. o In November 2022, New Holland Construction, a CNH Industrial brand and a subsidiary of Stellantis NV, launched fifteen new models of excavators covering all weight classes from 1 to 6.5 t, which also includes two fully electric excavators.
4. In October 2022 -
   a. Mecalac launched new electric equipment, including an 11.3tonne e12 excavator and the es1000 swing loader, at Bauma 2022 in Munich, Germany.
   b. According to the European Commission, the new Euro 7 standards will result in cleaner vehicles on the road and better air quality. It also helps the Commission meet the new stricter air quality standards proposed. The limits will be tightened for lorries and buses, while the lowest existing limitations for cars and vans will now apply regardless of the fuel used by the vehicle. The new rules also set emission limits for previously unregulated pollutants, such as nitrous oxide emissions from heavy-duty vehicles.
   c. In August 2022: At Bauma 2022, XCMG displayed its largest exhibition, including a new fully electric all-terrain crane, excavator, and loader. The most recent products are expected to provide competitive advantages in large-capacity batteries, fast charging, and zero emissions.

With the above developments across the region the market is witnessing major growth during the forecast period.

Market restraints

Rapid expansion of OHV rental services

The demand for rental services in the market studied is anticipated to witness significant growth during the forecast period, propelled by the robust adoption of technologically integrated equipment in rental fleets.

Europe is anticipated to experience a robust growth period on account of the rising use of heavy earthmoving machinery, mainly in Western European countries. Additionally, the strict implementation of regulatory norms by governments in the region may also bode well for the market studied.

Moreover, the increasing economic uncertainty, lack of capital, depreciation woes, costly breakdowns, and limited space availability contribute to the development of renting and used OHV in the market studied.

Several companies in the rental market have been focusing on establishing their presence in Europe by adopting growth strategies, such as product launches and establishing good relations with local suppliers and manufacturers, in the market studied. For instance,

1. In January 2024, Sumitomo Corporation acquired a United States OHV rental company to expand its OHV business. Through this expansion, the company expanded its OHV rental services across the country.
2. In January 2023, Ardent Hire announced the opening of its new super-hub depot at Chawston, near Bedford. The new facility is on the A1 and offers excellent access to London and the North. With over 6 acres of concreted space, the site includes office and workshop facilities and a new training center that is being built.
3. In December 2022, The Loxam Group announced the acquisition of HR ALUGUER DE EQUIPAMENTOS S.A. (“HR”) a leading general equipment rental player in Portugal to strengthen its presence in Portugal.
4. In July 2022, The Loxam Group, a global leader in the equipment rental industry, has recently acquired two companies - Sofranel SAS and Société Cominoise de Location SAS (SCL) – to consolidate its market position

in the northern region of France. This strategic move is expected to enhance the group's operational capabilities and expand its customer base, thereby enabling it to offer a wider range of equipment rental solutions to businesses and individuals in the region.

5. In June 2022, Britishvolt, a UK-based battery developer, has partnered with Sunbelt Rentals to help build its first full-scale 38 GWh battery gigafactory in Northumberland, as well as to develop heavy plant and equipment battery solutions. The two companies will operate an onsite rental facility at the gigafactory as part of their long-term strategic partnership. The advantages of having a rental facility on-site to meet equipment demands will result in a lower carbon footprint when traveling to and from rental facilities.
6. In July 2022, Hune Rental S.L.U. (“LoxamHune”), a wholly-owned subsidiary of the Loxam Group (“Loxam”), announced the acquisition of Talleres Arteixo S.L.U. to strengthen its presence in the north of Spain. This acquisition strengthens LoxamHune's dominant position in the Spanish equipment rental sector and expands the company's present network in the country's northwest.
7. In March 2022, The Kiloutou Group signed an agreement with the Catacap fund to acquire GSV, Denmark's leading equipment rental company, as well as management and employees who will be able to invest in the Kiloutou Group. Kiloutou, which has been accompanied by HLD and Dentressangle since 2018, will now reach a new milestone in its international development by taking positions in the resilient and dynamic Danish market.

Lack of skilled labour may hamper the market expansion

The dearth of proficient labourers can give rise to a plethora of issues and unfavourable consequences. When a project isn't accomplished within the stipulated timeframe, it leads to additional construction expenses and dissatisfied customers. Moreover, inadequate training amplifies the likelihood of workplace accidents, which poses a significant threat to the workers and can create predicaments for construction firms.

Currently contractors, builders, and construction companies are facing a significant challenge in the form of a labour shortage deficit. To address this issue, it is crucial to put effective strategies into practice. One of the most effective solutions is to prioritize the use of machinery in place of labour that has traditionally been done by hand.

By utilizing technology and automation, businesses can increase their productivity, improve their efficiency, and decrease their dependence on manual labour. This strategy not only helps companies address the labour shortage issue, but also creates a safer and more secure work environment for employees.

To reduce the labour intensity of larger projects, businesses can make use of advanced equipment such as pumps and machines. By doing so, they can not only increase their productivity and efficiency, but also create more job opportunities, boost their profits, and operate more sustainably. These tools enable companies to accomplish their tasks more quickly and accurately, while also minimizing the risk of human error and injury. As a result, businesses can achieve their goals more effectively and compete more successfully in their respective markets.

The European market has experienced a slowdown in economic growth due to unusual demand. The ongoing turbulence in the market and the sovereign debt crisis have led to growth constraints in Western European nations. However, Scandinavian countries like Sweden, Norway, and Denmark may be unaffected by these crises and uncertainties.

The market for heavy OHV anticipates a sufficient rate of growth in commercial and household spending by 2030. In addition, the crisis has forced numerous construction sites to delay their plans. Western Europe's construction spending is probably going to remain flat or barely grow at all.

Key recent developments

- In April 2024, Liebherr AG launched the R 924 G8 crawler excavator during the Intermat Show held in Paris. The R 924 G8 model exhibited at the Intermat event is equipped with a Leica Geosystems semi-automatic

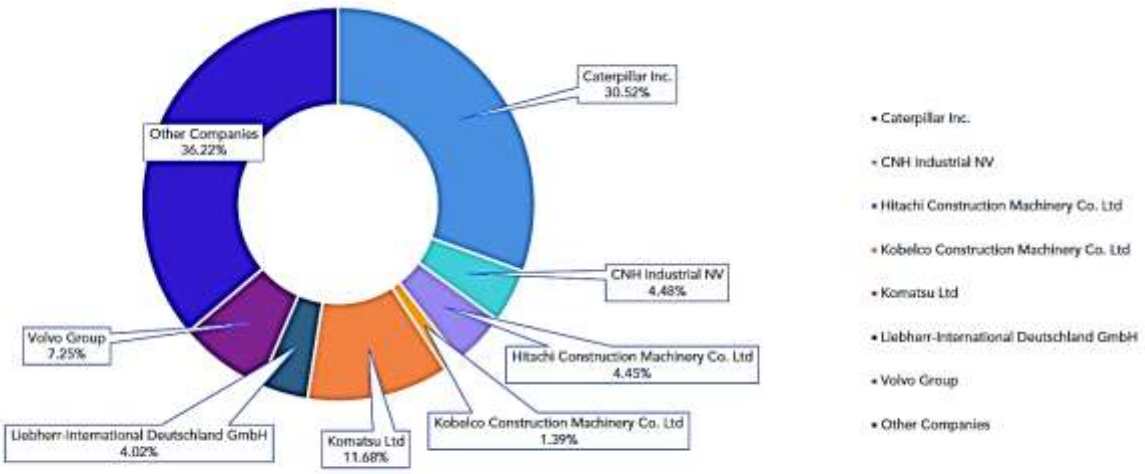
machine control system which is factory-fitted in Colmar (France). Additionally, the model has been equipped with two new options, a Skyview 360° camera, and a urea-filling pump. The Skyview 360° option enables the operator to monitor the entire working area around the machine on a single screen, providing a bird's eye view with no blind spots.

- In March 2024, Liebherr AG, a leading global manufacturer of construction machinery, has recently made a significant investment of Euro 2.2 million in Austria to set up manufacturing facilities. As a result of this investment, the company has initiated the production of cutting-edge battery-powered wheel loaders. This move is expected to revolutionize the construction industry by providing sustainable and eco-friendly equipment to contractors and builders.
- In February 2024, John Deere introduced the new S7 Series of combines, a family of harvesters designed for efficiency, harvest quality, and operator friendliness. Harvest time is no time to let up in the chase for efficiency in the United States. The new S7 series consists of four different models, namely S7 600, S7 700, S7 800, and S7 900. The S7 600 has a rated power of 333hp/249kw and can deliver a maximum power of 367hp/274kw, while the S7 700 has a rated power of 402hp/300kw and a maximum power of 460hp/343kw. The S7 800 has a rated power of 473hp/353kw and can deliver a maximum power of 540hp/402kw. The S7 900 has a rated power of 543hp/405kw and can deliver a maximum power of 617hp/460kw.
- In January 2024, John Deere has recently launched its 444 G-Tier Wheel Loader, which is a part of their performance tiering strategy. This model is specifically designed to offer customers reliability without including the extra features that they would typically find in a P-Tier or X-Tier machine. The 444 G-Tier is quite versatile and rugged, like the previously introduced 544 and 644 G-Tier machines, but at a lower operating weight and smaller size.
- In September 2023, LiuGong introduced a new 21-tonne electric wheeled loader in the European region. The electric wheel loader is equipped with a 423kWh large-capacity lithium iron phosphate battery.
- In July 2023, Caterpillar Inc. introduced the new Cat 995 wheeled loader in Europe. The loader offers 13% lower hourly fuel consumption and an additional 8% efficiency gain when operating in Enhanced Eco Mode.
- In May 2023, Volvo Construction Equipment recently unveiled a new battery-electric excavator, weighing 23 tons, that is designed for commercial use. This eco-friendly excavator is a significant part of the company's sustainable future strategy, which focuses on electrification and aims to reduce carbon emissions. With this latest addition, Volvo Construction Equipment is taking a giant leap towards creating a more sustainable future for the construction industry.
- In March 2023, Bobcat an American-based manufacturer is digging deeper into fully electric technology with its latest concept machines revealed at Conexpo-con/agg 2023. The leading construction and agriculture machinery company unveiled what it calls the “world’s first” all-electric skid-steer loader alongside a new autonomous concept model that’s in a category all its own. Resulted in a boost market for off-highway wheels in the United States.

Vendor market share

United States

OHV market, revenue share (%), by manufacturer, United States, 2023

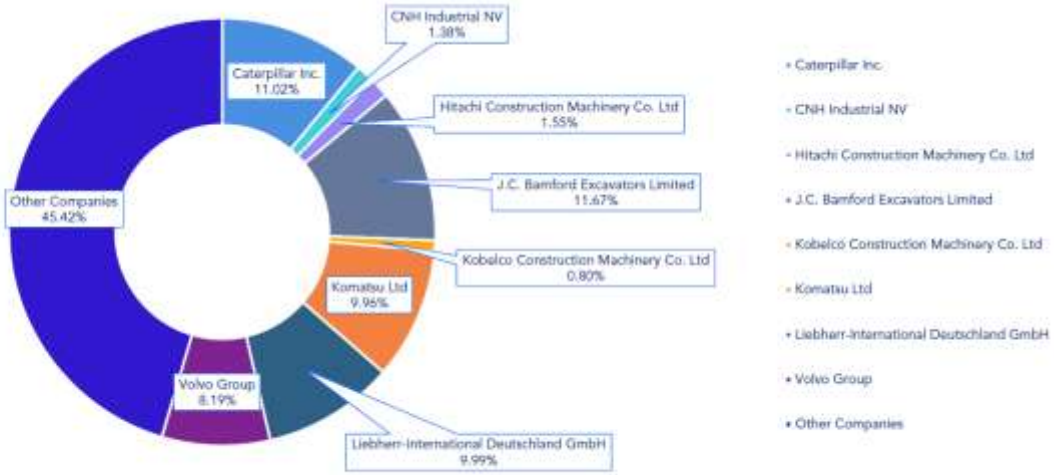


Market share has been calculated based on publicly-available revenue figures (annual reports, SEC filings, association data, etc.), third-party paid sources (Statista, D&B Hoovers, etc.), and our estimation of the companies' revenues in the relevant market (in case of unavailability of specific data in the public domain), based on the insights gathered from our industry experts on best effort basis subject to availability.

Source: Mordor Intelligence

Europe

OHV market, revenue share (%), by manufacturer, Europe, 2023



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Source: Mordor Intelligence

Market segmentation

United States

OHV market, revenue in USD billion

By Machinery Type	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	CAGR % (2019-2024)	CAGR % (2024-2029)
Excavators	18.8	24.8	29.0	24.1	26.3	28.3	30.3	32.5	34.8	37.3	40.0	8.5%	7.2%
Loaders	4.8	6.3	7.4	6.2	6.7	7.2	7.8	8.3	8.9	9.5	10.2	8.6%	7.1%
Cranes	1.5	2.0	2.3	1.9	2.1	2.2	2.4	2.6	2.7	2.9	3.2	8.4%	7.3%
Bulldozers	0.3	0.4	0.5	0.4	0.5	0.5	0.6	0.6	0.7	0.7	0.8	11.7%	6.7%
Motor Graders	0.3	0.3	0.4	0.3	0.4	0.4	0.4	0.5	0.5	0.5	0.6	9.3%	7.6%
Dump Truck	2.5	3.3	3.9	3.3	3.6	3.9	4.2	4.5	4.8	5.1	5.5	9.0%	7.4%
Others	0.5	0.7	0.8	0.7	0.7	0.8	0.8	0.9	0.9	1.0	1.1	7.1%	7.1%

Source: Mordor Intelligence

OHV market, volume in thousand units

By Machinery Type	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	CAGR % (2019-2024)	CAGR % (2024-2029)
Excavators	165.1	215.7	249.8	206.1	222.4	236.3	251.1	266.4	282.0	299.4	318.1	7.4%	6.1%
Loaders	83.4	109.1	126.4	104.3	112.6	119.7	127.0	134.7	142.5	151.1	160.5	7.5%	6.0%
Cranes	12.2	15.9	18.4	15.1	16.3	17.3	18.4	19.6	20.7	22.0	23.4	7.3%	6.2%
Bulldozers	2.0	2.8	3.3	2.8	3.1	3.4	3.6	3.8	4.0	4.3	4.5	10.8%	5.7%
Motor Graders	5.3	7.0	8.1	6.7	7.3	7.8	8.3	8.8	9.4	10.0	10.6	8.0%	6.5%
Dump Truck	6.5	8.5	9.9	8.2	8.9	9.5	10.1	10.7	11.4	12.1	12.9	7.9%	6.3%
Others	12.9	16.6	19.0	15.4	16.4	17.1	18.2	19.3	20.4	21.6	22.9	5.9%	6.0%

Source: Mordor Intelligence

OHV market, revenue in USD billion

By Propulsion Type	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	CAGR % (2019-2024)	CAGR % (2024-2029)
Internal Combustion Engine	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.3	0.5	-	83.9%
Electric and Hybrid	28.6	37.8	44.3	36.9	40.3	43.3	46.4	49.8	53.2	57.0	61.2	8.6%	7.2%

Source: Mordor Intelligence

OHV market, volume in thousand units

By Propulsion Type	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	CAGR % (2019 - 2024)	CAGR % (2024-2029)
Internal Combustion Engine	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.4	-	93.2%
Electric and Hybrid	287.4	375.5	434.8	358.7	386.9	411.1	436.7	463.3	490.3	520.2	552.5	7.4%	6.1%

Source: Mordor Intelligence

Europe

OHV market, revenue in USD billion

By Machinery Type	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	CAGR % (2019-2024)	CAGR % (2024-2029)
Excavators	29.6	32.3	35.2	38.5	35.2	34.4	36.5	39.1	42.1	45.3	48.1	3.0%	7.0%
Loaders	7.1	7.8	8.5	9.3	8.5	8.3	8.8	9.4	10.2	10.9	11.6	3.1%	7.0%
Cranes	2.3	2.5	2.7	3.0	2.7	2.6	2.8	3.0	3.2	3.5	3.7	3.1%	7.0%
Bulldozers	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	4.6%	8.2%
Motor Graders	0.4	0.4	0.5	0.5	0.5	0.4	0.5	0.5	0.5	0.6	0.6	2.4%	6.9%
Dump Truck	3.8	3.9	4.2	4.5	4.1	4.0	4.3	4.6	4.9	5.3	5.6	1.3%	7.0%
Others	0.9	0.9	1.0	1.1	1.0	0.9	1.0	1.0	1.1	1.2	1.2	1.6%	5.5%

Source: Mordor Intelligence

OHV market, volume in thousand units

By Machinery Type	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	CAGR % (2019-2024)	CAGR % (2024-2029)
Excavators	261.2	280.7	302.3	325.6	293.7	284.6	301.0	320.0	343.1	366.4	387.3	1.7%	6.4%
Loaders	128.3	137.9	148.6	160.1	144.5	140.1	148.2	157.5	168.9	180.4	190.8	1.8%	6.4%
Cranes	18.5	19.9	21.4	23.1	20.8	20.2	21.4	22.7	24.4	26.0	27.5	1.8%	6.4%
Bulldozers	1.3	1.5	1.6	1.7	1.6	1.6	1.7	1.8	1.9	2.1	2.2	3.0%	7.6%
Motor Graders	8.6	9.2	9.8	10.5	9.4	9.1	9.6	10.2	11.0	11.7	12.4	1.2%	6.3%
Dump Truck	9.6	9.9	10.5	11.4	10.3	10.0	10.6	11.3	12.1	12.9	13.7	0.8%	6.5%
Others	20.8	22.3	23.7	24.9	22.0	21.1	22.0	23.1	24.4	25.7	26.7	0.3%	4.9%

Source: Mordor Intelligence

OHV market, revenue in USD billion

By Propulsion Type	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	CAGR % (2019-2024)	CAGR % (2024-2029)
Internal Combustion Engine	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.4	0.6	-	84.3%
Electric and Hybrid	44.2	48.0	52.3	57.1	52.2	50.9	54.2	57.9	62.4	67.0	71.2	2.9%	6.9%

Source: Mordor Intelligence

OHV market, volume in thousand units

By Propulsion Type	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	CAGR % (2019-2024)	CAGR % (2024-2029)
Internal Combustion Engine	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.3	0.5	-	93.5%
Electric and Hybrid	448.2	481.3	517.9	557.2	502.2	486.5	514.4	546.5	585.7	625.0	660.1	1.7%	6.3%

Source: Mordor Intelligence

Market opportunities and trends

Introduction to advanced technology in OHV

Recent advancements in OHV can give contractors new capabilities while also improving safety and productivity. Industry trends such as skilled worker shortages, volatile energy prices, and equipment theft can help incentivize contractors to use new equipment-related technologies to achieve goals such as task automation, energy efficiency, and job site security.

Local players in the market are trying to increase the efficiency and productivity of their operations through the integration of telematics technology like fleet management, location tracking, etc., into the workflow. For instance, Berlin-based construction tech startup Flex Cavohas received government backing. The platform has roped in a USD 2.7 million research allowance from the German government. On the one hand, it rents OHV from well-known manufacturers to construction companies of all sizes. On the other hand, it develops software solutions for digital fleet management.

Construction is one of the most hazardous industries for workers. New safety technology directly built into equipment can help to improve worker safety tracking. As an example: In-cab monitoring systems can detect signs of distraction or fatigue by tracking an operator's head and eye movement. Proximity-detection systems can help operators detect people nearby and reduce the risks posed by blind spots. Collision-avoidance systems may reduce the likelihood of accidents and equipment damage.

Several key players are introducing new technological features in their equipment which in turn is anticipated to enhance the demand for excavators and loaders in coming years. For instance,

In September 2023, Devlon (Doosan Construction Equipment) introduced the DX20ZE-7 mini excavator in Europe. The excavator is equipped with a 20.4kWh lithium-ion battery pack and consists of telematics systems that allow operators and dealerships to monitor machine health, location remotely, and performance via app or website.

In May 2023, Hyundai Construction Equipment Europe HW65A wheeled excavator and the HX65A crawler model. The new wheeled excavator consists of Hyundai's Hi-MATE telematic system is available to provide remote monitoring of machine working and performance.

In March 2022, Komatsu released a new digital hub, My Komatsu, which the company says allows contractors to interpret visual analyses of data collected from numerous sources, such as from different OEM equipment. The My Komatsu application, with the ISO-15143-3 (AEMP 2.0) telematic API (application programming interface), connects telematic data from all equipment or can access it through monitoring and analysis services.

The improved productivity and efficiency of these vehicles, the growing demand for construction machinery data analysis, and the need to reduce the operational costs associated with their repair and maintenance are the major reasons for the growing adoption of telematics solutions in these vehicles.

According to the provisional results of the Federal Statistical Office (Destatis), in the initial six months of 2020, over 1,281 people lost their lives in road accidents in Germany. This can be reduced with the support offered by different telematics solutions, which provide a safer driving alternative to drivers, thereby aiding in the growth of the market.

Telematics has long been utilized to locate vehicles, containers, and other assets in the logistics business. The technology performs a similar function in the heavy equipment and construction industries but with extra advantages. Asset tracking improves security and protects against vehicle and equipment theft, abuse, and misappropriation.

Construction technology is developing, allowing organizations to construct structures more quickly and safely. GPS OHV tracking is not the only way this technology may boost productivity in the construction sector. OHV tracking with GPS technology provides several economic advantages such as preventing breakdowns, avoiding costly downtime, etc.

Increase in digitalization in the OHV market

The OHV market has been undergoing significant changes over the last few years, and one of the most notable changes is the rise of digitalization. Digitalization has revolutionized the construction industry and has enabled the OHV market to become more efficient, productive, and safer.

Digitalization involves the use of advanced technologies such as the Internet of Things (IoT), artificial intelligence (AI), and machine learning (ML), among others, to make OHV smarter, more connected, and more efficient. This has led to the development of smart OHV, which can communicate with each other, collect and analyze data, and adjust their operations accordingly.

Numerous companies in the market have taken a strategic approach to assist fleet operators in enhancing their maintenance and fleet management practices. They do so by offering improved visibility into machine performance, enabling predictive maintenance, and automating key tasks. For instance,

In 2022, Manitowoc is expanding and investing in support services with the upcoming launch of CONNECT in 2022. This new initiative will enable remote monitoring through an app-based system that allows owners and operators to view real-time crane information, receive alerts, and exchange data. More features will be added in the future to enhance the functionality of the system.

The CONNECT platform is specifically designed to cater to fleet management, sustainability operations, service and maintenance for users, and connectivity for cranes. It can be accessed via smartphones, tablets, and laptops. This platform marks the beginning of a new digital era for owning and operating Manitowoc cranes. With just a few clicks, users can access a range of features and data related to their cranes through the app-based platform. They can analyze performance, check service gauges, diagnose faults, and much more.

In January 2023, Komatsu Europe introduced a new interface for wheeled loader operators to interact with the machine's assist systems. According to company officials, the product resulted from customer feedback asking for solutions that deliver safety, real-time information, machine monitoring, efficiency optimization, and other features.

In December 2022, InTempo Software announced a new partnership with LHP Telematics, a provider of location, status, and usage data for rental equipment. Together, the companies have developed InTempo MX, a turn-key solution that merges telematics and rental management information from GPS locations and machine utilization data to dispatch information and preventive maintenance schedules. This makes it possible to increase available rental days and reduce unscheduled maintenance events.

In June 2022, Kubota, the leading mini-excavator supplier in the United Kingdom and Ireland, launched a new telematics portal to assist OHV operators in increasing machine efficiency and security. The 'Kubota Tracking System' portal keeps users up to date on the KX080-4a2 machines in their fleet and can be accessed via a PC, laptop, tablet, or smartphone, implying that data from a Kubota fleet can be viewed at any time and from any location. As construction costs rise in other areas, users are looking for new ways to help Kubota machine users understand where savings can be made, and efficiency can be increased.

With the above-mentioned development across the region is likely to create a lucrative opportunity for the market in the coming years.

6. Review and outlook of Indian Off-Highway Vehicles (OHV)

Review of Indian OHV

OHV are largely used for construction and infrastructure activity

OHV are engineering machines and vehicles used for construction (industrial and infrastructure), agriculture, mining, waste management, and logging activities. They are also used to prepare the ground, excavation, haulage of material, and dumping/laying in a specified manner. The various types of machines used are backhoe loaders, excavators, wheeled loaders, pick and carry cranes, dozers, and compactors.

Industry Structure

Earthmoving equipment	Material handling equipment	Road equipment
•Backhoe loader •Excavator •Wheel loader •Motor grader •Skid steer loader •Truck-type loader •Off-highway truck	•Pick and carry cranes •Telehandlers •Crusher and screener	•Compactors •Pavers

Source: CRISIL MI&A Consulting

Excavators, backhoe loaders, pick and carry cranes, tele handlers and compactors account for ~75% of the OHV industry's revenue. In the construction sector, OHV is mainly used in infrastructure and industrial construction. For instance, equipment like rollers, compactors are used through the lifecycle of a road project, while in sectors like housing and commercial construction, usage is limited to the initial stages of land development.

Construction equipment has an average life of about 7-8 years, depending on frequency of the usage. However, various components need to be regularly serviced and replaced and hence, after-sales service forms a critical part of the manufacturers' offering.

Hirers and small contractors are the major end-users of OHV. Large engineering, procurement and construction (EPC) companies account for only about 10% of total demand. Backhoe loaders are most popular in the Indian market as they are multi-functional (i.e. excavation and loading), relatively low on maintenance and easy to mobilize. It accounted for ~40% (volume) and ~28% (value) of the OHV market, followed by excavators ~29% (volume) and ~47% (value) which have a specialized usage pattern.

Strong brand name helps JCB dominate backhoe segment, technology access aid Tata Hitachi in excavator segment

Strong brand name, largest service network help JCB expand share, it is able to maintain its market share despite intense competition, while new players are unable to provide discounts, given their fragile financials caused by the prolonged downturn. Wide margin, after-sales services revenue, and in-house building capabilities provides JCB an edge over others.

Technology access favours Tata-Hitachi and LandT Construction Equipment. These companies stand to gain from their partner companies' experiences in other Asian markets, where they have a strong foothold. Tata Hitachi leads the segment with its wide dealership network of over 300 outlets and popular models. LandT Construction Equipment has recovered its lost share from competitors by focusing on high-quality models.

Doosan, Liugong, and Kobelko have entered the market recently. They hold a minimal share and focus on high tonnage segments. Another new entrant, Sany India, has launched products in the popular segment (2030 tonne) and garnered ~5% share in the past 3-4 years through aggressive pricing.

Escorts accounts for a lion's share in pick and carry cranes and compactors

Escorts had the largest share in crane segment as of FY20 with a capacity of 10,000 units annually. The company sold ~7800 units in FY20. It is into a JV with Tadano to produce specialised cranes that address high-capacity use cases.

ACE has also maintained its share for FY20 with the launch of NX series multi activity cranes in the market. This enables them to earn better margins owing to them being technologically superior cranes.

Escorts is the leading player in this segment with close to ~75-80% share. We do not expect any major change in the top three players' market share over the next 2-3 years, as new ones are still trying to establish a stable dealership and after-sales service network.

Product profile

	Share of end-user segment	Application	Price range (Rs mn)	Life span (years)
Backhoe loader		Tractor-like unit fitted with a loader-style shovel/bucket on the front and a backhoe on the back	2-2.5	6-7
Excavator		Tracked vehicle designed to dig or grade, or move earth and large object	5-5.5	7-8
Pick & carry cranes		Designed to transport to a site and use with different types of load and cargo with little or no setup or assembly	3.5-4	8-9
Compactors		Used to compact soil, gravel, concrete, or asphalt in the construction of roads and foundations	2-2.5	6-7

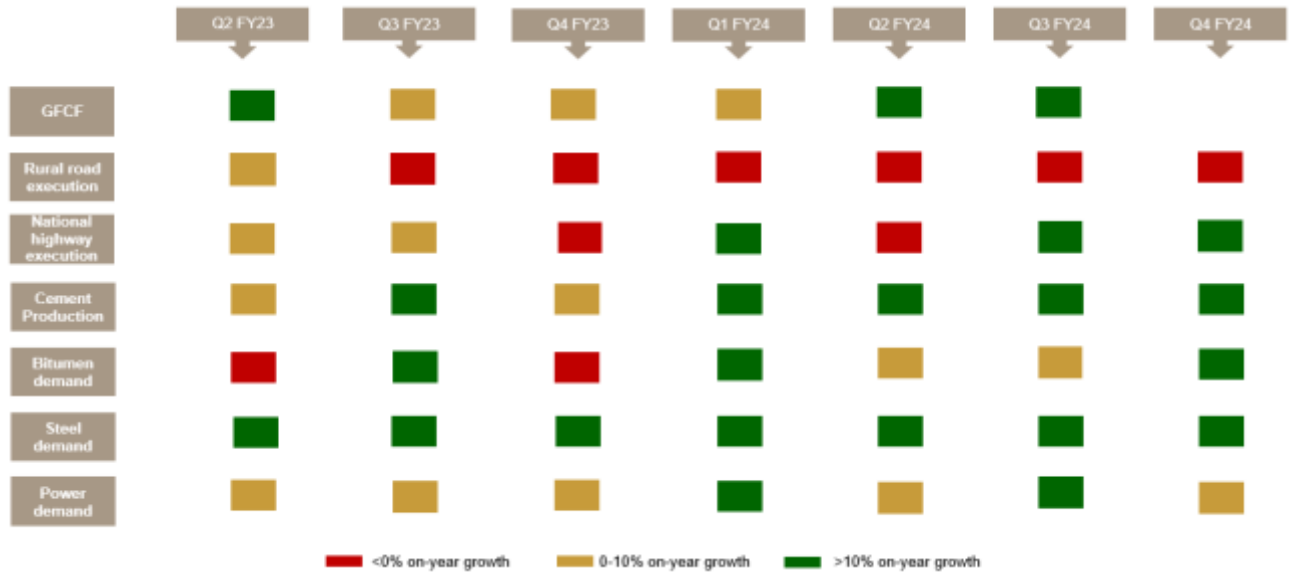
High industry concentration *Low industry concentration*

Source: CRISIL MI&A Consulting

Indicators for construction equipment industry on a rise

Quarterly movement in the sales of the equipment can be easily tracked through a host of factors as in the chart below. Execution of projects was robust in FY23 especially for mining activities. To be sure these parameters were on a high base of fiscal 2022. The momentum has continued in fiscal 2024.

With all High frequency indicators showing positive signs, OHV industry sales at all time high



Source: CRISIL MI&A Consulting

Government spending on infrastructure: A major driver is the Indian government's significant investment in infrastructure development projects like roads, railways, and urban metro systems. This focus on infrastructure translates into a demand for equipment used for earthmoving, excavation, and transportation of materials.

Economic growth: India's robust economic development fosters an environment where businesses are expanding, leading to a rise in commercial and residential construction activities. This increased building necessitates a larger fleet of construction equipment.

Rising urbanization: India's rapid urbanization is another major factor. As cities grow, there's a need for new housing, commercial spaces, and improved infrastructure. This fuels the demand for equipment for building high-rises, laying pipelines, and developing new urban areas.

Mining sector: India's mining industry is also a significant contributor to the demand for construction equipment. The rise in production of coal and other minerals necessitates heavy-duty machinery for efficient extraction and transportation.

India has the potential to become a global hub for manufacturing and exports of construction equipment

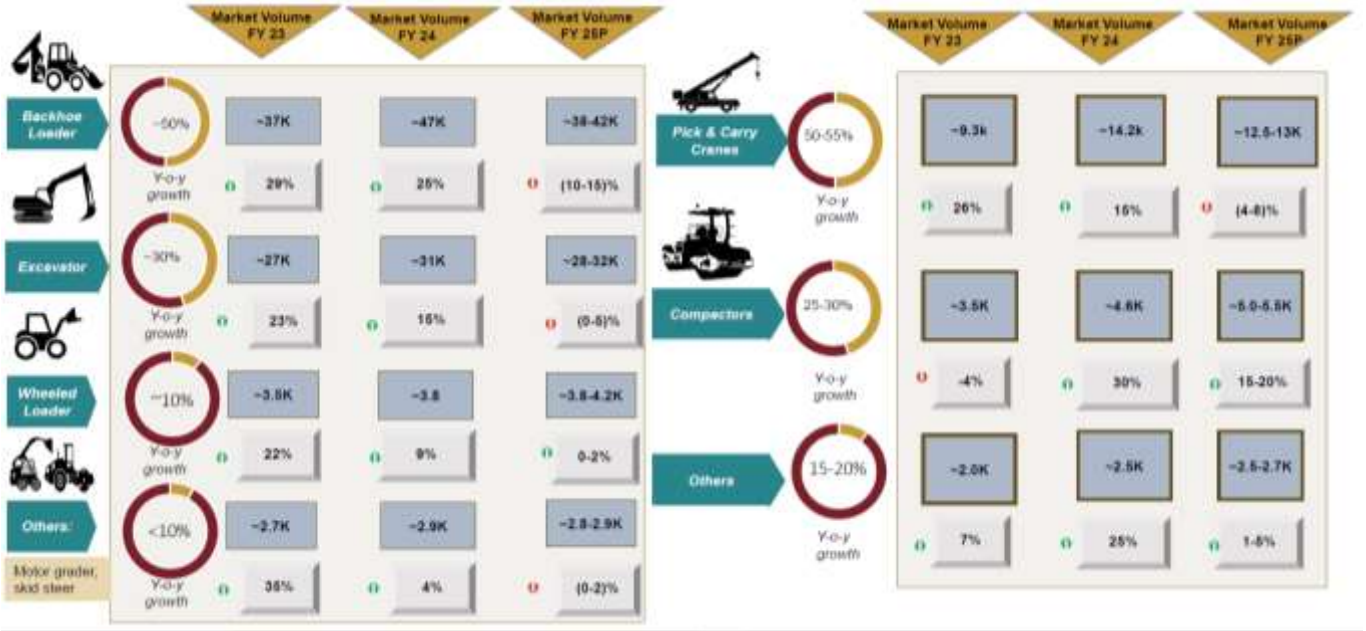
The Indian OHV Industry has a large presence of global OHV OEMs alongside domestic players, which has led to implementing of the 'State-of-the-Art' manufacturing technologies, which are at par with the world. Further, it is also important to note that domestically manufactured equipment is being exported to the EU, UK and US, implying that the industry meet global quality standards and are well-accepted in advanced markets globally. With the new CEV IV emission norms now completely adopted by the industry, there are significant opportunities for the Indian OHV industry to tap into developed markets.

Outlook of Indian OHV

Volumes in fiscal 2024 reach all time high; growth projected to normalise in fiscal 2025

OHV volumes are expected to witness slowdown post high growth seen in previous two fiscals; but will continue to maintain high level of 100K+. Growth in central government capital allocation to end-user industries like urban infra, railways, irrigation and ports amongst others observes normalization in FY25.

OHV sector grew 24% in volume terms in fiscal 2024 driven by growth in the end user industries like roads, railways, and urban infrastructure. Volume growth normalisation of (8-10) % is projected for fiscal 2025 but the industry is expected to maintain high levels of ~95K-100K in volume sales with growing end user industry segments like roads, railways, and urban infrastructure. With more than 60% share, backhoe loaders and excavators dominate the OHV industry.



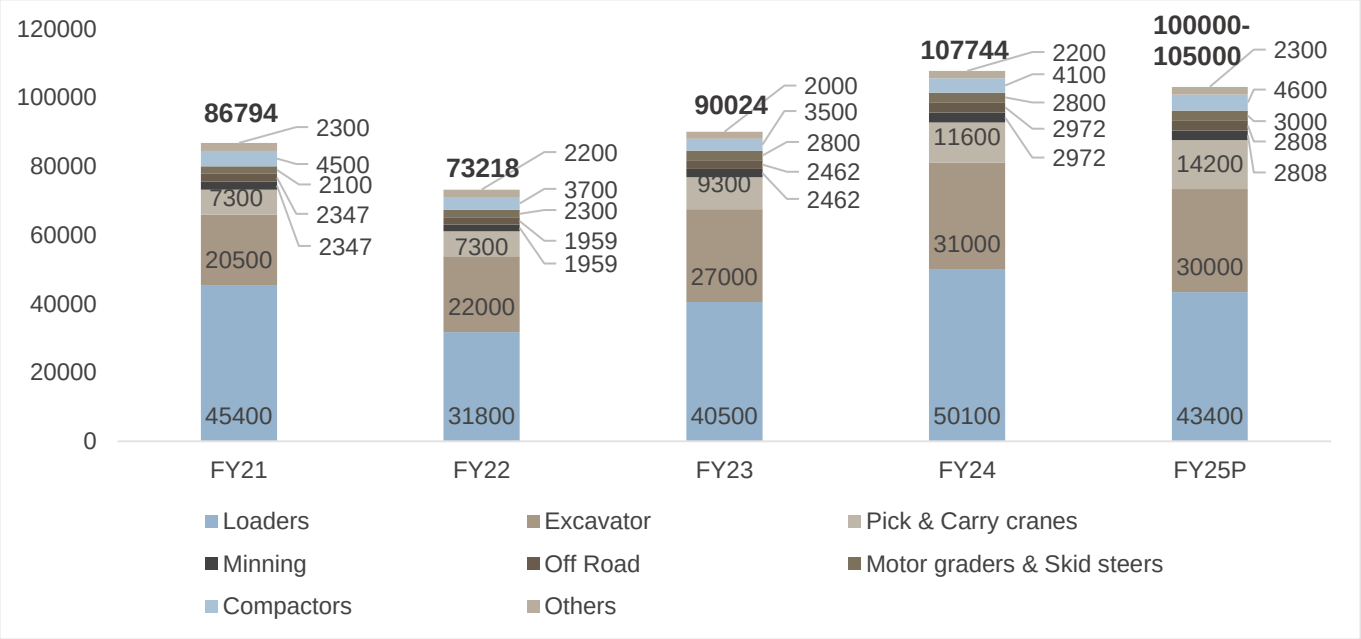
Note: Others include tele-handlers, screeners and crushers

Source: Industry, CRISIL MI&A Consulting

The infrastructure sector growth is led by healthy rise on high bases in state and central government capex budgets, Government initiatives such as Gati Shakti and the focus on NIP to boost the infrastructure segments while Mining sector is expected to show growth in FY25 to meet the rising demand from the Power and metal sectors. The volume sold are at an all-time high with rising infra and mining activity in the backdrop coupled with newer machinery complying to the BS-IV norms introduced in the market.

With humongous central government push and rising spur in construction activities, market size is expected to increase due to higher realisations and increase in prices passed on to consumers due to cost inflation of raw materials. Despite this normalization, the overall market outlook remains positive.

Equipment volumes seen moderating to ~100K in fiscal 2025

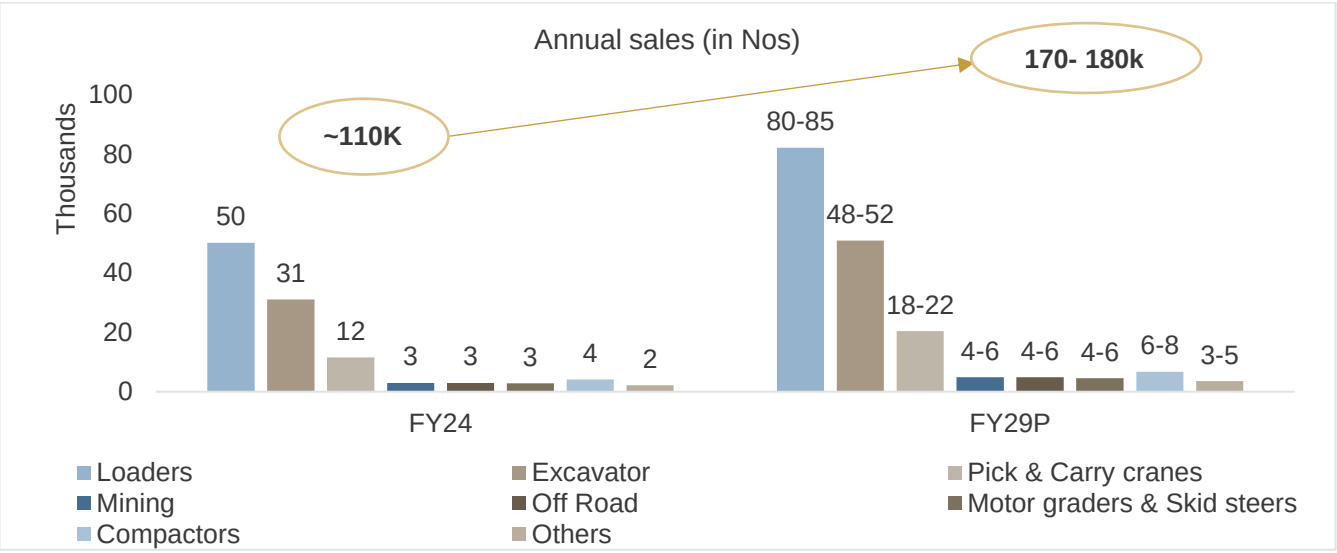


Source: Industry, CRISIL MI&A Consulting

Long term potential intact; driven by growth in end-user segments

Total Infrastructure capital expenditure to grow at 9-10% CAGR during FY24-29 with Roads, Railways and Urban Infrastructure constituting ~55-60% of total spending. Other sectors like Ports, Airports and Building construction to also record healthy growth in coming fiscals.

We expect the OHV industry to grow at 10-12% over the 5 years with the overall sales volumes expected to reach ~170-180k by fiscal 2029.



Source: Industry, CRISIL MI&A Consulting

Note: Loaders include both Backhoe and wheeled loaders, while mining and off-road sales volumes is considered at 2-4% of overall sales volume for the projection period. Others include tele-handlers, screeners and crushers

List of leading infrastructure projects coming up over the next 5 years - Transport infrastructure

Sr. No.	Project Name	Sub Industry	Cost (₹. Cr.)
1	High Speed Rail Corridor (Mumbai-Ahmedabad) Project	Railways	108,000
2	Regional Rapid Transit System (Delhi-Gurgaon-Shahjahanpur-Behror) Project	Railways	100,000
3	Vadhavan Port (Dahanu) Project	Ports	76,200
4	East West Dedicated Freight Corridor Project	Railways	73,804
5	Kerala Semi High-Speed Rail Corridor (Thiruvananthapuram-Kasargod) Project	Railways	66,405
6	Versova-Virar- Palghar Sea Link Project	Roadways	63,426
7	Chennai Metro Rail Project - Phase II	Railways	63,246
8	Waterfront Development (Mundra Port) Project - Expansion	Other Shipping Infrastructure	57,594
9	East Coast Corridor Project	Railways	56,749
10	Hindu Hruday Samrat Balasaheb Thackeray Maharashtra Samruddhi Mahamarg	Roadways	55,335
11	Delhi Metro Rail Project - Phase IV	Railways	55,000
12	Eastern Freight Corridor Project	Railways	51,219
13	Expressway (Pune-Bengaluru) Project	Roadways	49,241
14	Western Freight Corridor Project	Railways	46,178
15	International Container Transshipment Terminal (Great Nicobar Islands)	Other Shipping Infrastructure	44,000
16	Dighi Port Project - Expansion	Ports	42,490
17	International Airport (Navi Mumbai) Project	Airways (Aviation Infrastructure)	41,302
18	Udhampur-Qazigund-Srinagar-Baramula BG Railway Line	Railways	41,119
19	Delhi Metro Rail Project - Phase III	Railways	41,079
20	Pune-Bengaluru Greenfield Expressway (Bammanala-Muttagadahalli)	Roadways	38,724

List of leading infrastructure projects coming up over the next 5 years - Building infrastructure

Sr. No.	Project Name	Sub Industry	Cost (₹. Cr.)
1	Slum Redevelopment (Dharavi) Project	Other Community Services	26,000
2	Exhibition-cum-Convention Centre (Dwarka)	Other Community Services	25,703
3	Data Centre and Technology Park (Madhurawada and Kapulauppada)	Miscellaneous Services	21,844
4	Corporate Office Park (Jogeshwari) [Nexus]	Business Complexes	21,000
5	Hyderabad Pharma City (Mucherla) Project	Other Parks	16,395
6	Artificial Intelligence Park (GIFT City) [Immerso AI Park]	Other Parks	16,000
7	Sardar Vallabhbhai Patel Sports Enclave (Ahmedabad) Project	Tourism and Recreation	15,000
8	High Rise Residential Complex (Sector 76 and 77) [Privana West]	Real Estate	14,872
9	Jewellery Park (Mahape)	Other Parks	14,467
10	Integrated Township (Hinjewadi) Project [Life Republic]	Real Estate	13,890

Sr. No.	Project Name	Sub Industry	Cost (₹. Cr.)
11	Integrated Township (Ambernath) Project	Real Estate	13,695
12	Common Central Secretariat (New Delhi) Project	Other Community Services	13,450
13	Data Centre (Chennai)	Miscellaneous Services	13,200
14	Industrial Area (Maval) Project [Phase-IV]	Other Parks	12,628
15	Residential-cum Commercial Complex (Ghitorni)	Real Estate	12,497
16	Gujarat International Finance Tec-City (Gandhinagar) Project	SEZ/EPZ	12,089
17	Data Centre (Pimpri Chinchwad)	Miscellaneous Services	12,000
18	Residential Complex (Worli BDD Chawls) - Redevelopment	Real Estate	11,744
19	Residential Complex (Sarojini Nagar) - Redevelopment	Real Estate	11,660
20	Industrial Park (Golana and Mitali)	Other Parks	11,345

List of leading infrastructure projects coming up over the next 5 years – Mining

Sr. No.	Project Name	Sub Industry	Cost (₹. Cr.)
1	Kerendari-A Coal Block Project	Coal	17,290
2	Gevra Open Cast Coal Mining Project - Expansion	Coal	11,816
3	Kotre Basantpur Pachmo Open Cast Coal Mining Project	Coal	9,294
4	Lignite Mining (Valia) Project	Lignite	8,999
5	Gare Palma Sector-I Coal Mining Project	Coal	8,780
6	Gare Palma Sector-II Coal Mining Project	Coal	7,642
7	Kusmunda Coal Mining Project - Expansion	Coal	7,612
8	Amadand Opencast Coal Mining Project - Expansion	Coal	7,357
9	Ultra Supercritical Coal Power (Khedar) Project	Coal	7,250
10	Banhardih Coal Mining Project	Coal	6,750
11	Iron Ore Beneficiation and Pelletisation (Keonjhar and Paradip) Project	Iron Ore	6,650
12	Iron Ore Beneficiation Plant (Ghantikhal)	Iron Ore	6,112
13	Sanghamitra Open Cast Coal Mining Project	Coal	5,746
14	Moonidih Coking Coal Washery Project	Coal	5,562
15	Noamundi Iron Ore Mining Project - Expansion	Iron Ore	5,558
16	Dipka Open Cast Coal Mining Project - Expansion	Coal	5,241
17	Amrapali Opencast Coal Mining Project - Expansion	Coal	5,136
18	Pakri Barwadih Opencast Coal Mine Project - Expansion	Coal	5,045
19	Banded Hematite Quartzite Beneficiation Plant (Hedri)	Iron Ore	5,000
20	Iron Ore Beneficiation and Pelletisation (Paschimi Singhbhum) Project	Iron Ore	4,700

7. Review and outlook of Indian tractor industryReview of Indian tractor industry

Historic domestic tractor industry

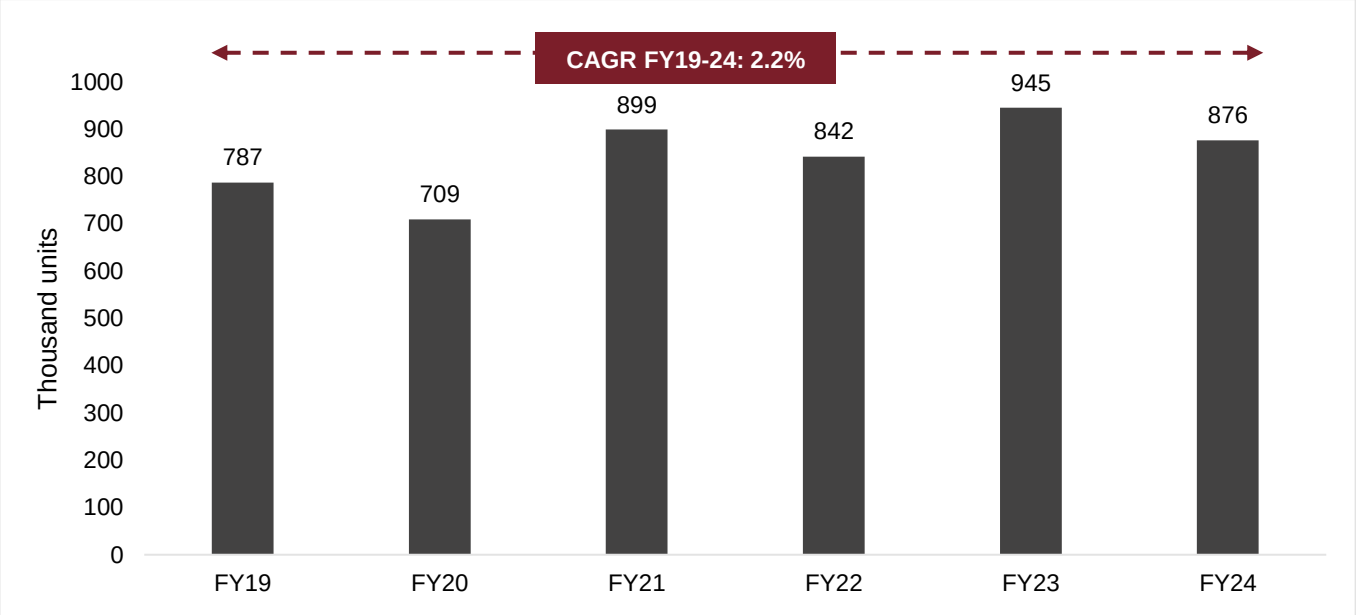
In fiscal 2022, domestic tractor demand dropped 6.4% on-year after growing 26.6% in fiscal 2021. Price hikes by OEMs, higher inventory at dealerships, lower commercial demand, negative farmer sentiment owing to rising cost of cultivation, low fertiliser availability and increase in other expenditure (such as marriages and other social occasions) hampered the demand.

In fiscal 2023, tractor sales grew 12.2% on-year to an all-time high of ~945,000 units. Healthy crop prices, sound reservoir levels owing to above-normal monsoon, higher MSPs announced by the government and better rabi acreage, all led to positive farmer sentiment. Healthy festival demand because of various schemes and discounts supported the retail growth momentum. Commercial demand during the fiscal, however, remained rangebound in fiscal 2023 owing to slower retail momentum in eastern states and a complete ban on sandmining. In the last fiscals, the governments in states such as Bihar, Jharkhand and Uttar Pradesh had clamped down on illegal sand mining, negatively impacting commercial demand for tractors.

Last fiscal, domestic tractor sales dropped by 7.4% on-year to ~875,724 units, on account of lower reservoir levels and negative farmer sentiments. Negative farmer sentiments also impacted the festive demand, with sales in the festive months September, October, and November for fiscal 2024 - being lower by 6% on-year as compared to the same period last fiscal. Uneven rainfall distribution with monsoon being 6% below normal for the season has led to slower pick-up in the retail market. Barring north-west and central India, remaining regions reported deficit rainfall over normal impacting tractor demand. Reservoir level for the country as of 2nd May 2024, remained at 28% capacity as a percentage of live capacity. Erratic monsoon, lower reservoir levels, anticipated decline in rabi acreage contributed towards a 7.4% on-year decline in tractor sales for fiscal 2024.

A large part of domestic tractor sales is driven by replacement demand. The typical holding period for a tractor is 6-9 years. Most of the tractors in the country is replaced within 7-8 years. Of the domestic demand, 50-60% constitute replacement demand. In states with high penetration of tractors, such as Punjab and Haryana, the replacement demand accounts for 70-80% of total sales. On the other hand, states with lower farmer incomes than that in Punjab and Haryana have a lengthier replacement cycle (higher age tractors) vs industry average.

Domestic tractor industry logged 2.2% CAGR between fiscals 2019 and 2024



Source: TMA, CRISIL MI&A Consulting

Factors impacting tractor industry

Improving crop prices and pick-up in infrastructure development to drive domestic tractor demand

Parameters	Impact			
	FY21	FY22	FY23	FY24E
Farm income	**F**	**N**	**F**	**N**
Crop prices (minimum support prices or MSPs)	F	N	F	F
Crop output	F	N	F	N
Kharif output	F	N	F	N
Rabi output	F	N	F	N
Demand indicators	**NF**	**N**	**N**	**N**
Infrastructure development	NF	N	F	F
Sand mining	N	N	N	N
Finance	**N**	**N**	**N**	**F**
Agri credit, finance availability	N	N	N	F
Supply	**F**	**NF**	**NF**	**N**
Channel inventory	F	NF	NF	N
Player action: Pricing and products	F	F	N	N

Note: F - Favourable, NF - Not Favourable, N - Neutral
Source: CRISIL MI&A CONSULTING

Irrigation intensity and monsoons

Irrigation plays a vital role in determining the demand for tractors. The irrigation spend, which increased significantly in the last two decades, have aided both irrigation and cropping intensity, thus leading to higher and stable farm incomes. Irrigation intensity is expected to improve further over the medium term, thus supporting tractor sales. Punjab and Haryana have the highest irrigation intensity and also account for the highest tractor penetration in India. Thus, as irrigation facilities improve in other parts of India, tractor penetration will see a corresponding increase. However, extremely fragmented landholdings in certain states may deter them from reaching higher tractor penetration. Besides, deficient monsoons also impact reservoir levels and, in turn, irrigation.

Landholding pattern

The average landholding size in India is very low at 1.16 hectares (ha) as against the world average of 3.7 ha, with about 68% of the farmers being marginal farmers (holding less than 1 ha). This has been a negative factor for tractor sales. Moreover, the average landholding size has been declining due to socio-economic factors such as the break-up of joint families and division of ancestral land. This has both positive and negative impacts on tractor demand. With the division of larger landholdings into smaller ones, the number of tractors required is expected to rise. However, the purchase of a tractor would become uneconomical for small farmers when the farm sizes are reduced (as a result of the sub-division of already small landholdings). But with the proportion of landholdings below 2 ha being very high, consolidation of landholdings will drive demand in the long run.

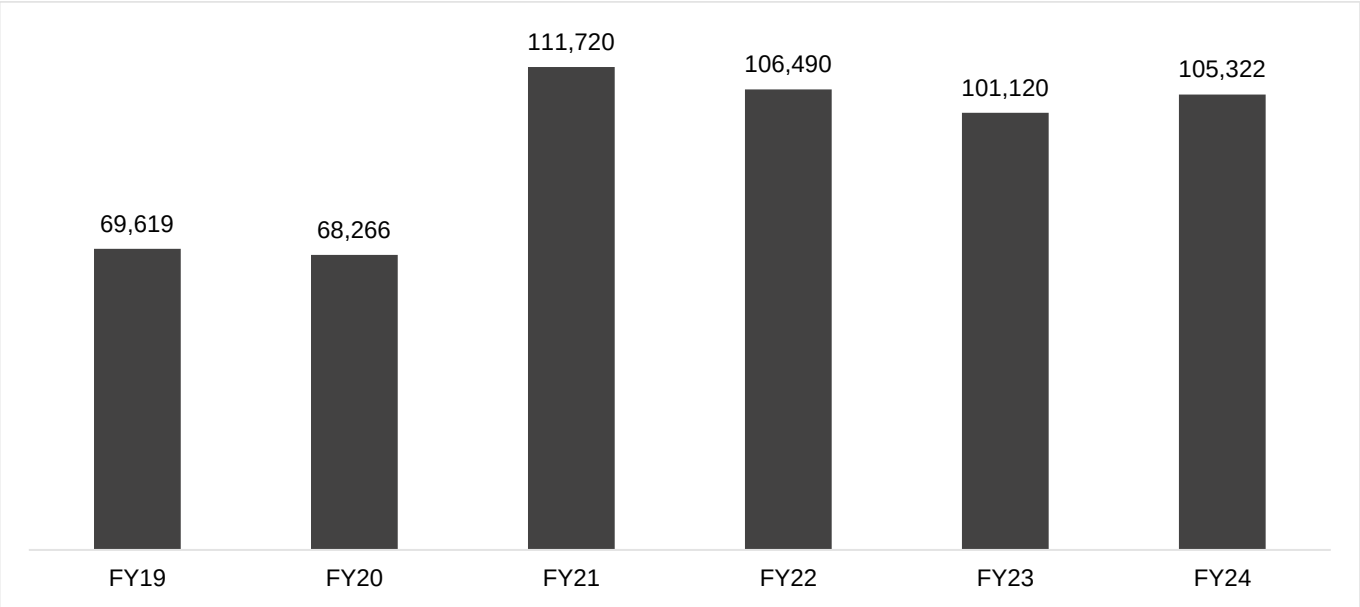
Availability of credit

In India, 70-75% of tractors purchased are on credit. So, finance availability becomes a key demand driver. Any major changes in financing norms directly impact the demand for tractors. Agricultural credit usage in farm mechanisation has been growing steadily over the years, thus enhancing farmers' ability to buy tractors. Public sector banks (PSBs) and non-banking financial companies (NBFCs) are major financiers. Over the last decade, the cumulative share of PSBs, co-operative banks and regional rural banks has come down from about 75% to 15-20%, with NBFCs now accounting for about 50-55% of the market.

MGNREGA spending

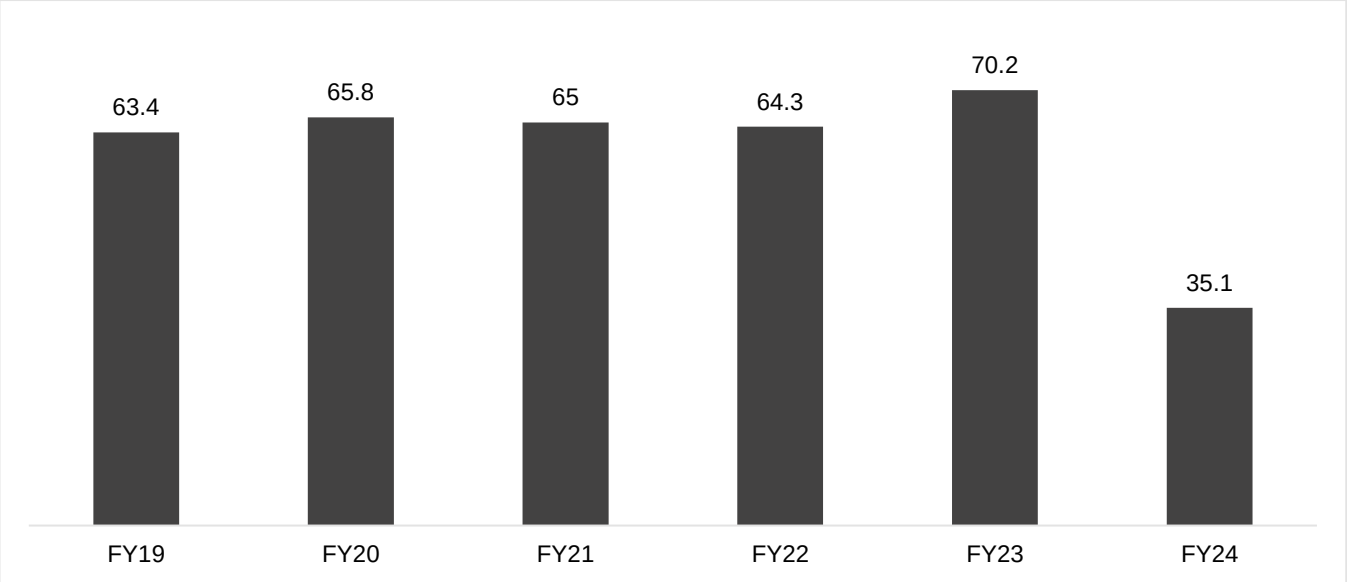
MGNREGA is an employment-generating and asset-creating scheme of the central government and make up a large portion of the expenditure budget of the Department of Rural Development. It is a social safety net scheme and is driven by demand. So, periods of rural stress or shocks result in higher-than-budgeted spending under this scheme. In fiscal 2024, the budget allocation for MGNREGA was Rs 86,000 crore. In fact, the actual spends under the scheme have on average been higher than the budgeted amount in the past.

MNREGA expenditure (in Rs crore)



Source: Ministry of Rural Development, CRISIL MI&A CONSULTING

MNREGA expenditure as a percent of total agriculture and agriculture allied works



Source: Ministry of Rural Development, CRISIL MI&A CONSULTING

MSPs of food grains

The government's price policy for major agricultural commodities seeks to ensure remunerative prices to the growers for their produce with a view to encouraging higher investment and production and safeguarding the interest of consumers by making available supplies at reasonable prices. Towards this end, the government announces MSPs for 22 mandated crops and fair and remunerative prices (FRP) for sugarcane based on the recommendations of the Commission for Agricultural Costs and Prices (CACP) and after considering the views of

concerned State Governments and central ministries/ departments. The 22 crops are 14 kharif crops (paddy, jowar, bajra, maize, ragi, tur (arhar), moong, urad, groundnut, soybean (yellow), sunflower seed, sesamum, nigerseed and cotton), six rabi crops (wheat, barley, gram, masur or lentil, rapeseed and mustard and safflower) and two commercial crops (jute and copra). In addition to that, MSP for toria is fixed on the basis of MSPs of rapeseed and mustard and that for de-husked coconut on the basis of that of copra. While recommending MSPs, CACP considers important factors, such as cost of production; the overall demand-supply situation of various crops in domestic and world markets; domestic and international prices; inter-crop price parity; terms of trade between agricultural and non-agricultural sectors; likely effect of price policy on rest of the economy; and a minimum of 50% as the margin over the cost of production.

- **MSP for paddy and maize (fiscals 2018-2023):** An analysis of the trend shows that there has been an exponential rise in MSPs for paddy and maize. The MSP for paddy, which was Rs 1,550 per quintal in fiscal 2018 increased to Rs 2,040 in fiscal 2023, logging a 5.6% CAGR. Meanwhile, MSP for maize increased from 1425 per quintal to Rs 1962, logging a 6.6% CAGR.
- **MSP for major oil seeds:** The MSP for groundnut logged a 5.6% CAGR from Rs 4,450 per quintal to Rs 5850 during the period. Similarly, sunflower seeds and soyabean witnessed a CAGR of 9.3% and 7.1%, respectively.
- **MSP for wheat (2017-18 to 2022-23):** The MSP for wheat was Rs 1,625 per quintal in fiscal 2018. This increased to Rs 2,015 in fiscal 2023 at a CAGR of 4.4%.

MSPs are the government-fixed procurement prices of food grains. These prices form a base for the calculation of market prices. Any change in MSPs directly affects farmers' income and, in turn, their loan repayment capability. MSPs have helped reduce the volatility in farm incomes, notwithstanding some fluctuation in agricultural production because of deviation in rainfall. In fiscal 2019, the average MSP hike was around 15-20% on-year. Coupled with, good crop output, it resulted in higher farm income across major regions. However, last fiscal, the MSP hike was only 4-6% on-year. Going forward, the government is unlikely to increase MSPs sharply because of its fiscal constraints and as part of its effort to control inflation, which is seen emerging as the central pillar of its economic policy.

Cropping pattern

State governments are encouraging and educating farmers to improve farm productivity to boost their incomes. To improve farm productivity, they are urged to take up multiple cropping. Farmers will find use of tractors extremely helpful in this context as they quicken the operations. Farmers will be able to move on to the next crop faster with the use of tractors.

Increase in cash crop production

Extensive cultivation of cash crops has yielded higher incomes for farmers and boosted tractor demand. Over the years, cultivation of cash crops has been rising in terms of the land area and the share of output.

Nature of soil

Smaller tractors are more suitable for soft soil conditions, as conducting agricultural operations in such conditions requires low-power tractors. In India, the northern states of Punjab and Haryana and the western parts of Uttar Pradesh have relatively soft soil. Hence, the demand for small tractors is high in these regions. In the southern and western regions, the soil is relatively hard, thus requiring medium and large-sized tractors.

Crop mix

The crop mix and the nature of crops cultivated have a significant role in determining the choice of a tractor. Medium and large tractors are preferred for the cultivation of cash crops such as sugarcane and cotton, which demand high intensity activities and for which timeliness of operations is significant. Similarly, high-power tractors are preferred in the case of intensive farming and multiple cropping, land bed preparation, harvesting and when transportation needs to be quick.

Replacement demand

The lifespan of a tractor is estimated at 18-20 years, though in actual it may vary depending on the soil and cropping conditions. Usually, farmers prefer replacing their old tractors with upgraded, high-power vehicle. Hence, given the increasing income levels replacement demand in states such as Punjab and Uttar Pradesh would be high for high-power tractors.

Purpose of use

The choice of a tractor depends on whether the customer is a farmer, who purchases for agricultural purposes, or a contractor, who would use it for commercial purposes such as in construction projects for the transportation of goods and materials. High-power tractors are preferred for construction purposes.

Resale price of tractors

A tractor is typically replaced after 6-8 years of use (though the lifespan is 18-20 years). Since farmers use the proceeds from the sale of old tractor to pay the margin money for the new one, the likely resale price is a key consideration while buying the new one.

PMGSY completion trend

The Pradhan Mantri Gram Sadak Yojana (PMGSY) is a one-time special intervention to provide rural connectivity, by constructing a single all-weather road, to the eligible unconnected habitations in the core network with a population of 500 persons and above (Census 2001) in plain areas. The phase 1 of the scheme was launched in 2000. Under the scheme, the Centre had recognised 178,184 habitations, of which 97% of the eligible and feasible habitations were connected as of November 2019.

Further, the government launched a new intervention in the scheme, namely PMGSY-II, in fiscal 2014 aiming to consolidate 50,000 km of existing rural road network to improve its overall efficiency as a provider of transportation services for people, goods and services. As of date, 41,434 km of rural roads have been sanctioned under PMGSY-II, of which 75% have been completed. The umbrella scheme involves construction/ upgradation of over 800,000 km of rural roads. Under PMGSY-I, 97% of the target has been achieved. PMGSY-III targets 40% lesser length that constructed over the last five fiscals.

The PMGSY-III, announced in the Union Budget 2019-20, aims to consolidate 125,000 km road length in states over the next five years. The scheme will also include 'through routes' and 'major rural links' that connect habitations to Gramin Agricultural Markets (GrAMs), higher secondary schools and hospitals.

It will entail an estimated cost of Rs 80,250 crore (central share Rs 53,800 crore and states' share Rs 26,450 crore).

The road length to be constructed under PMGSY-III is significantly lower than 218,000 km constructed under the umbrella scheme between fiscals 2015 and 2019. CRISIL Research expects investments in rural roads to slow down ~10% over the next five years, due to the lower targets.

Rural road construction (in km) in fiscal 2020 stood at ~27,000 km, almost half of ~49,000 km constructed in the previous year. In fiscal 2021, the construction was ~37,000 km and in fiscal 2022, ~42,000 km. Last fiscal, the construction remained muted and failed to achieve the target. This fiscal, the target has been cut to 38,000 km.

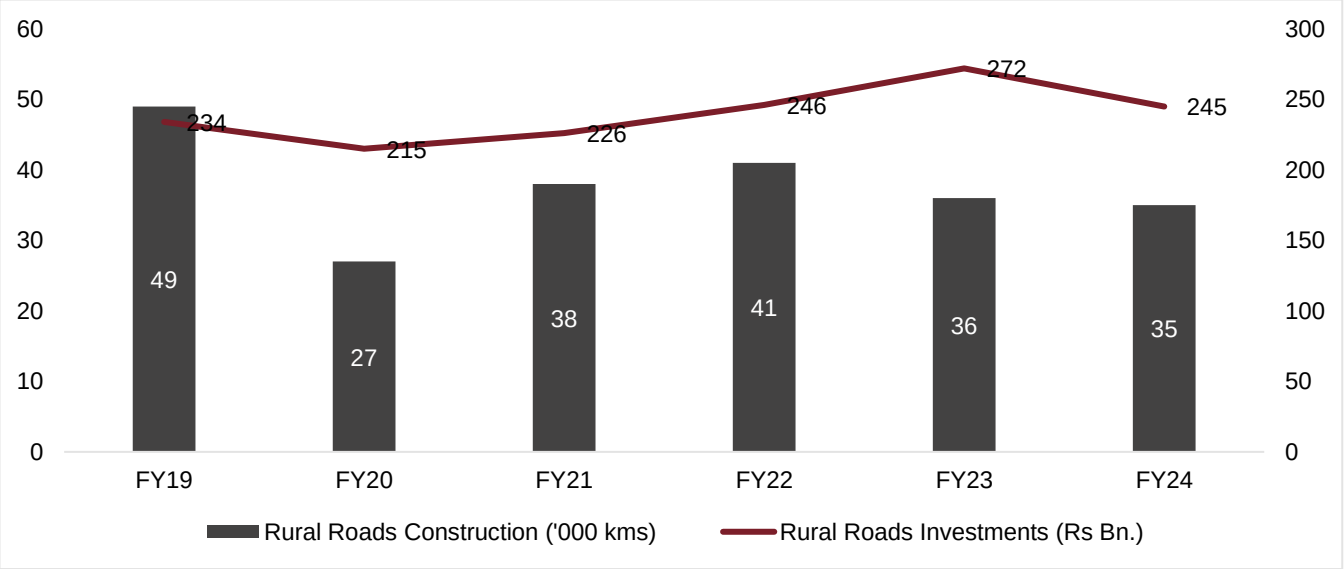
After fiscal 2017, central budgetary allocation to the scheme was kept at Rs 190 billion. In fiscal 2023, budgetary allocation was increased to Rs 195 billion. The actual expenditure, however, was lower than the allocation last fiscal, with achievement ratio slipping to 74% from 81% in fiscal 2019. Total investment in PMGSY, both state and Centre, was Rs 234 billion in fiscal 2019, up 35% from Rs 173 billion in fiscal 2018, because of an uptick in the length being constructed and higher cost per km.

Despite the challenges, the progress under PMGSY has been satisfactory. The vertical-wise details of achievement under the PMGSY (overall) are as follows:

Vertical	Sanctioned			Completed		
	No of roads	Road length (in km)	No of bridges	No of roads	Road length (in km)	No of bridges
PMGSY-I	164806	645605	7516	159783	613030	5864
PMGSY-II	6700	49885	765	5755	46468	562
RCPLWEA	1030	10231	463	363	5310	135
PMGSY-III	9972	77129	708	1984	29773	96
Total	182508	782850	9452	167885	694581	6657

Source: PIB, CRISIL MI&A CONSULTING

Investment in rural road construction

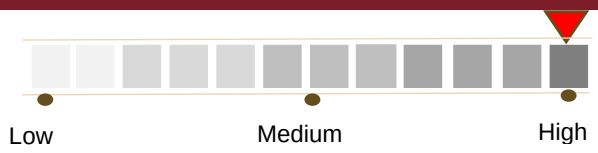
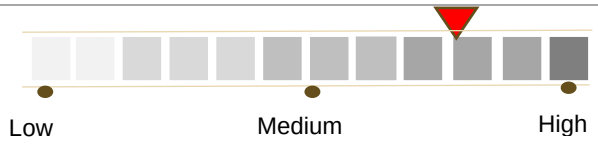
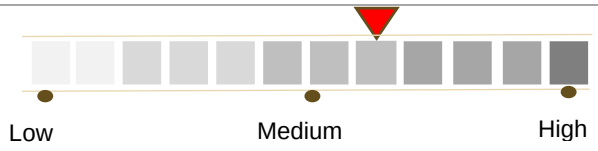
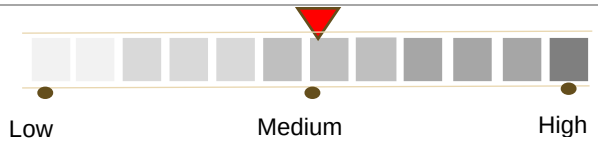


Source: Ministry of Rural Development, CRISIL MI&A CONSULTING

Residual construction target under PMGSY-II and future targets under PMGSY-III are largely concentrated in northern and eastern states in the country. It is expected that Odisha would see 15-20% of the targeted rural road construction under the PMGSY, Assam 9-11%, and Arunachal Pradesh, Bihar and Uttarakhand 5-10% each. Other states such as West Bengal and Himachal Pradesh and Union territory of Jammu also have potential for rural road construction under the scheme.

Demand drivers

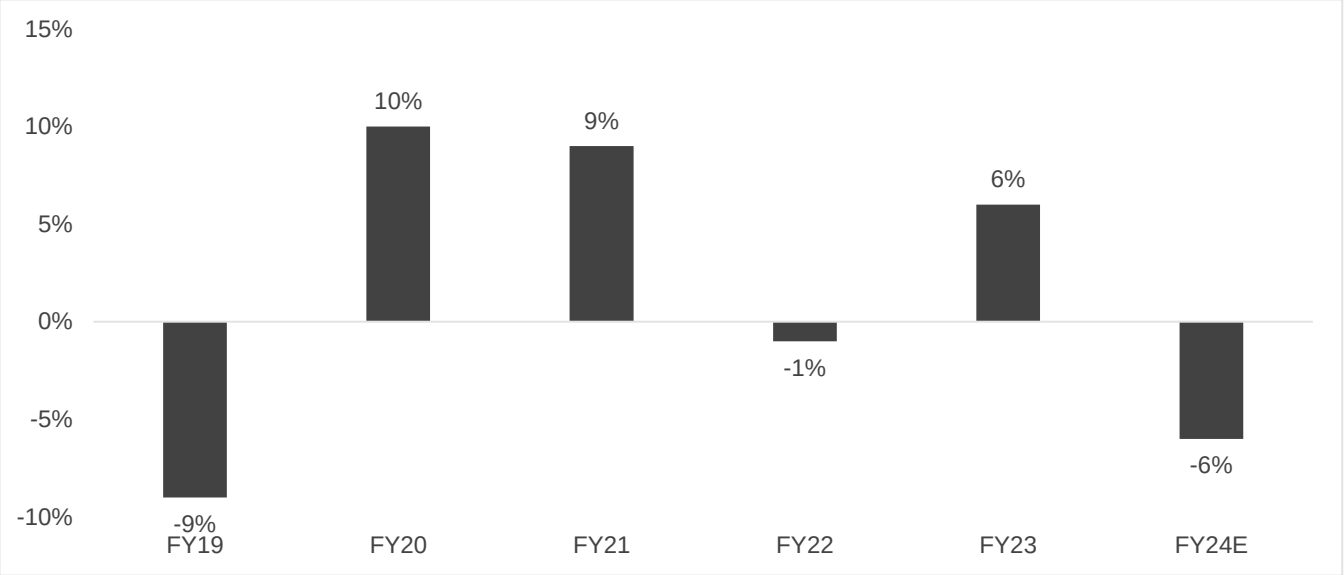
Tractor demand in the country is mainly dependent on farmer incomes from agricultural operations, which, in turn, gets impacted by various factors such as monsoon, crop prices, government procurement, etc. The government regulation governing rural infrastructure development also affects non-farm tractor demand, which accounts for roughly 20-25% of overall domestic demand for the vehicles. Additionally, availability of formal financing channels also supports the demand.

Risk factor	Impact
Monsoon performance	
Crop prices	
Government regulation	
Finance availability	

Monsoon performance

The south-west monsoon (Jun-Sep) and to some extent the north-east monsoon (Oct-Dec) are critical to the Indian agriculture sector as the overall farm output is dependent on the rains. A poor monsoon with uneven geographical spread and an unseasonal rainfall can severely impact the farm output, impacting the farmers' income and denting the rural economy. This, in turn, affects tractor demand. Monsoon, therefore, is the biggest risk factor for the tractor industry.

In fiscal 2018, the monsoon was normal and tractor demand saw revival, with sales increasing a healthy 22% on-year. In fiscal 2021, 9% above normal monsoon and positive retail sentiments contributed towards a substantial 27% on-year increase in tractor sales. In fiscals 2022 and 2023, monsoon has been normal, thereby contributing towards higher tractor sales, although in fiscal 2023 unseasonal rainfall in March damaged rabi crop to some extent impacting the farmer income and overall crop production. This fiscal, south-west monsoon was delayed in many states impacting the outlook for kharif.



Source: IMD, CRISIL MI&A CONSULTING

Crop prices

Though the central government announces MSPs for 22 crops, only paddy and wheat crops get procured on large scale. Other crops (pulses, oilseeds, vegetables, etc) are mostly sold to mandis/ private traders, and thus subject to high price volatility and cartelisation. Hence, even if the production is in surplus, subdued crop prices can have a negative effect on farmers' cash flow, and, in turn, impact their ability to purchase tractors.

Government regulation

There is significant government intervention in both agri and non-agri aspects of the rural economy. If the increase in MSP is marginal it hurts farm sentiments. The government's monitoring of sand mining activities, funds disbursal towards rural infra development, which are also key drivers for non-farm tractor demand (commercial/non-farm demand of tractors accounts for 15-20% of total tractor demand), can also have a significant impact on the industry.

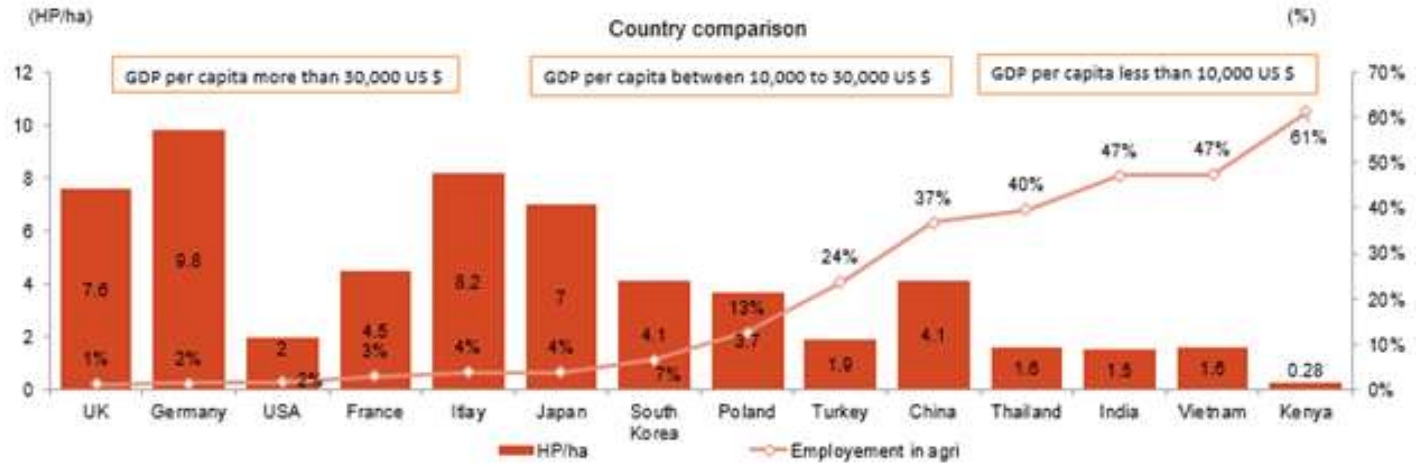
In fiscals 2021 and 2022, illegal mining was at a standstill in states such as Bihar, Jharkhand and Uttar Pradesh, which impacted commercial demand for tractors negatively. Last fiscal, a decline in construction led to slower growth in commercial demand. The factors that are impacting the demand this fiscal are ban on illegal mining and change in rules and regulations governing operation of brick kilns.

Cross-country comparison indicates healthy demand potential

Current tractor penetration in India as of fiscal 2023 is estimated to ~1.8 hp/ha (horsepower per hectare). Tractors are fast replacing bullock carts and labour, as renting a tractor or owning a low-hp tractor is cost-effective. Moreover, tractors earn rental income and help increase cropping intensity (multiple crops sown on the same land). In developed countries, tractor penetration is estimated to be in the range of 3-4 hp/ha, which facilitates superior crop yields relative to India. Even China, having a landholding size of 0.6 ha, has tractor penetration of 4.1 hp/ha.

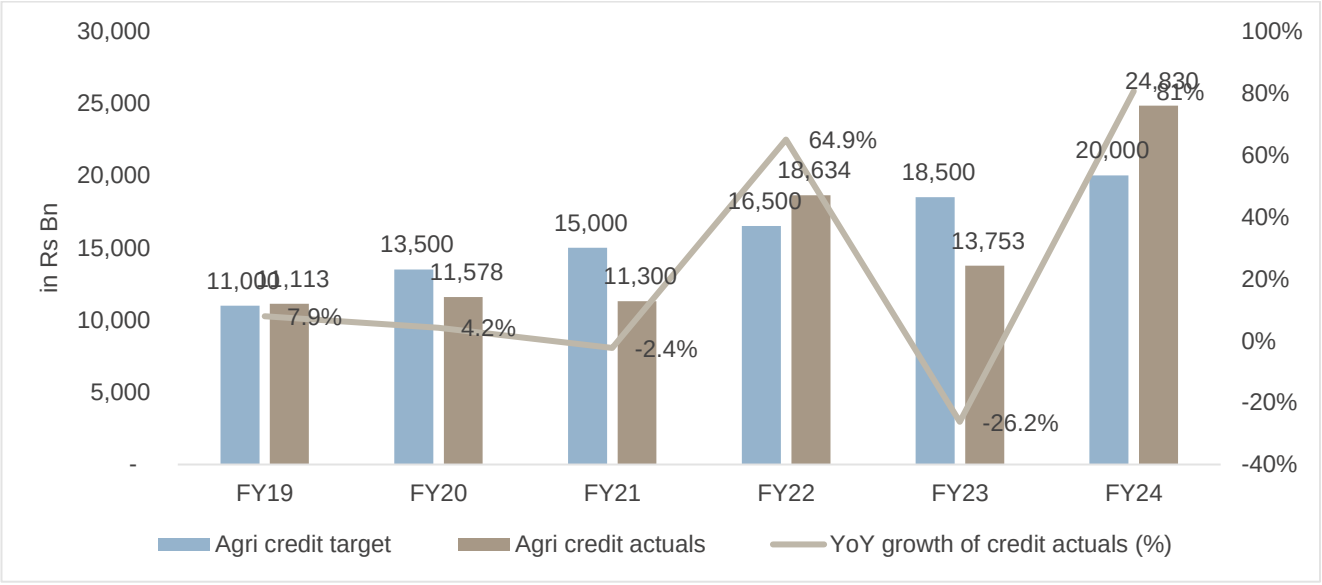
Lower employment in agriculture and higher GDP per capita are indicators for the countries having higher hp/ha. Hence, opportunity in this space is substantial given relatively low mechanisation levels in India.

Cross-country comparison of hp/ha



Finance and credit availability

Availability of formal financing channels also plays an important role in enabling industry growth as nearly 70-75% of the tractors purchased are backed by loans. However, as farm incomes are dependent on vagaries of monsoon and any failure in rainfall leads to rise in NPAs, financiers are cautious towards disbursing tractor loans. This impacts tractor sales. For instance, in last and this fiscal, financiers in Andhra Pradesh and Telangana have reduced tractor financing owing to increase in delinquency.



Source: CRISIL MI&A Consulting

Banks (public, private and other banks) account for 35-40% of the total tractor loan book. NBFCs account for the balance 55-60%. However, PSBs have more NPAs than private banks and NBFCs.

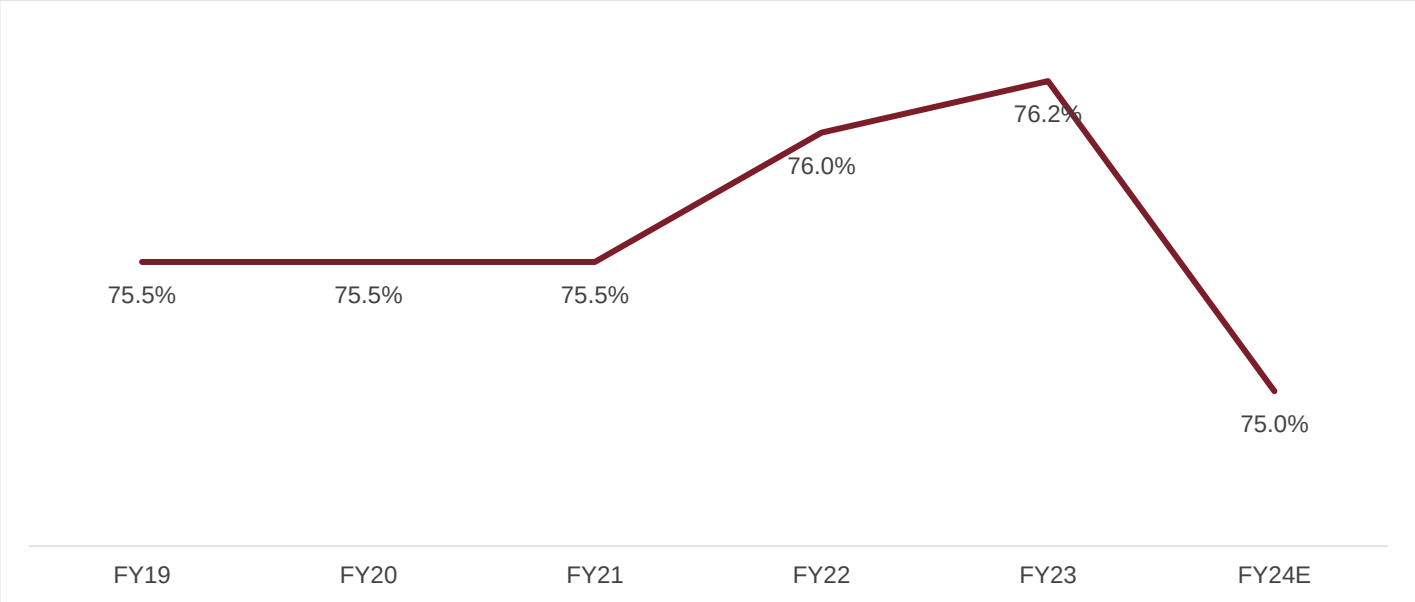
As majority of Indian farmers have low purchasing power, credit availability is key to boosting tractor demand. Currently, about 70-75% of the tractors are purchased on credit. This steady growth along with the government's emphasis on increasing agriculture credit has helped boost the domestic tractor demand. Tractor loans are easy to come by since agricultural credit is part of priority sector lending.

In Budget 2023-24, provision of Rs 450 crore has been made for the Digital Agriculture Mission started by the Modi Government, and about Rs. 600 crore allocated for the promotion of Agriculture sector through technology.

The total budget of the Ministry of Agriculture and Farmers Welfare, including Agricultural Education and Research, is about Rs 1.25 lakh crore in FY24. Out of this, provision of Rs. 60,000 crore has been made for the Pradhan Mantri Kisan Samman Nidhi (PM-Kisan).

Target for Agricultural credit has been increased to Rs 20 trillion from Rs 18.5 trillion in FY24

LTV (Loan to Value Ratio) rates

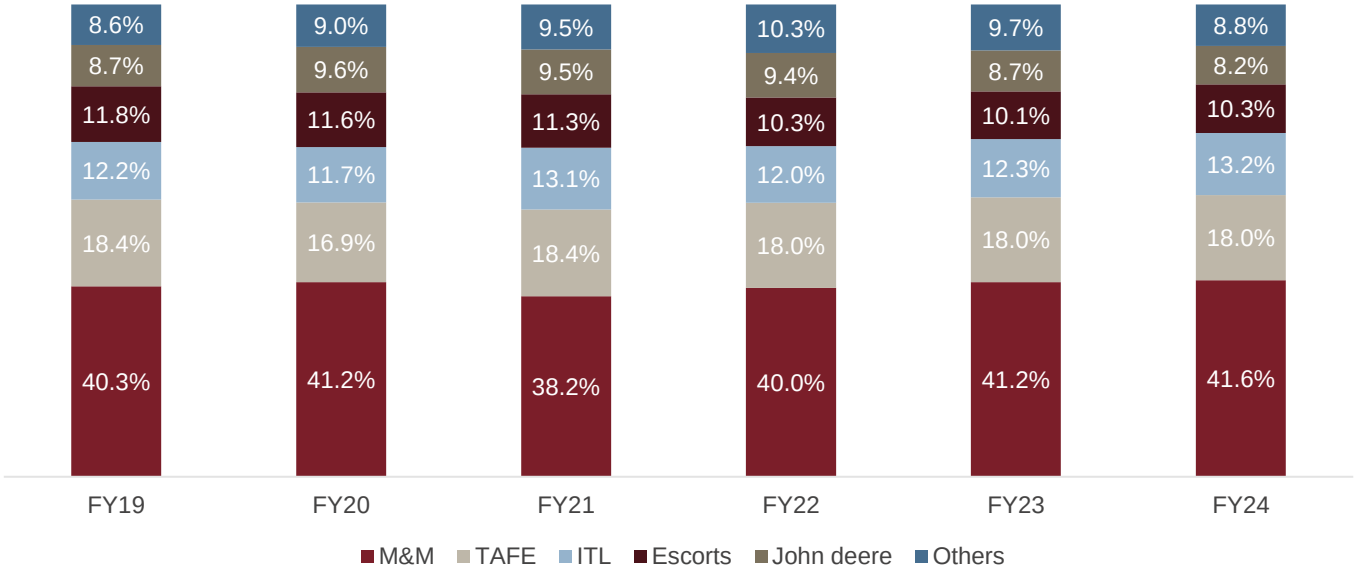


Note: E - estimated
Source: CRISIL MI&A CONSULTING

Competition

The structure of the domestic tractor industry has remained largely steady over the years. Mahindra and Mahindra (MandM) continued to lead with 41.2% market share and Tractors and Farm Equipment Ltd (TAFE) remained a distant second with 18% market share as of fiscal 2023. A strong pan-India network reach, strategic location of manufacturing facilities, good brand equity and a comprehensive product range from <20 horsepower (hp) to >50 hp have been the major factors behind MandM's consistent dominance of the industry.

Player-wise domestic market share (volume-wise): MandM gained significant market share last fiscal



Source: CRISIL MI&A CONSULTING

Going forward, CRISIL Research expects the competition in the industry to intensify further. However, the top five players will continue to account for 85-90% of the industry by volume. A strong distribution network, brand recall, captive financiers and diverse product range are critical to maintain market position in the tractor industry.

Tractor exports

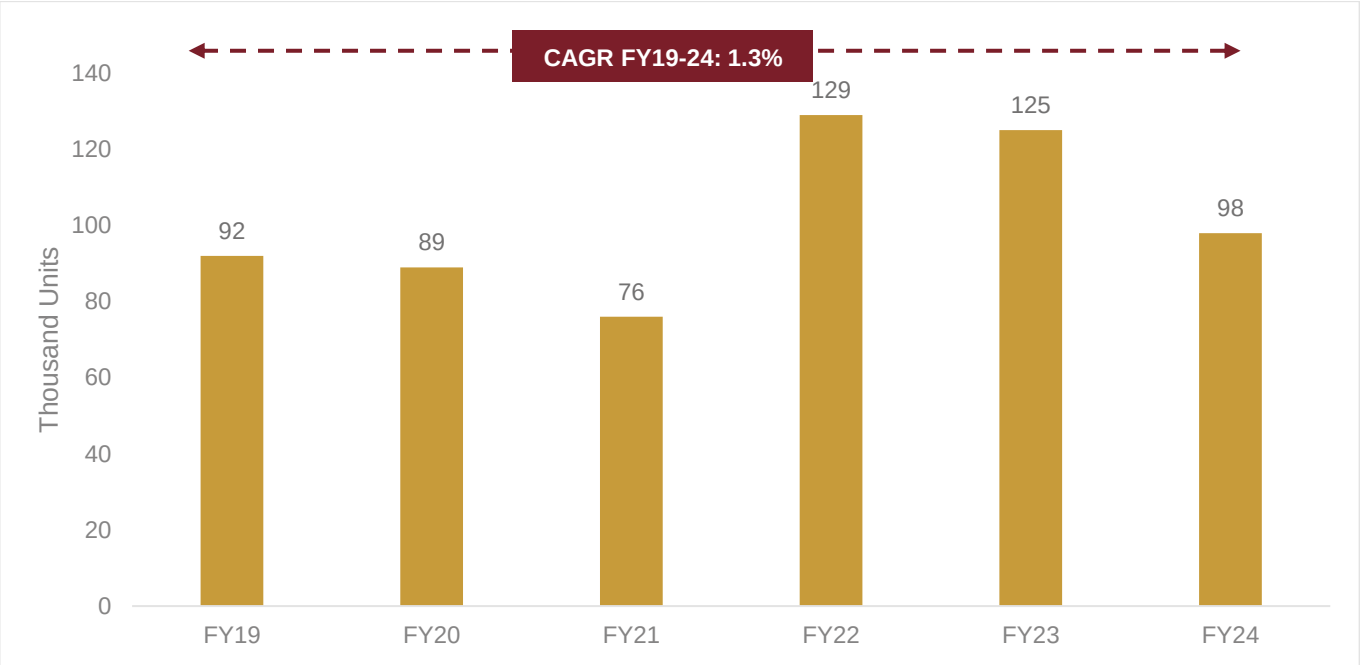
Exports, accounting for about 10% of the overall tractor sales as of fiscal 2024, on a low base of 90,000-100,000 post recording a 23-25% on-year decline in fiscal 2024. Revival in demand from the US, Europe and Asia to further support growth.

Strategic push, such as setting up a base in foreign countries, by players to cater to the global demand would aid export sales. ITL's Solis brand has also been gaining popularity in the European markets. With most of the global companies de-risking exports from China due to the complexities and disruptions in the nation, India has become the natural hedge against Chinese exports. Further, with most of the companies equipped to comply with TREM IV norms, exports have bloomed in the past few years.

The export data for Indian tractors over the years from FY19 to FY24 reflects a fluctuating trend in the international market. This data underscores the influence of various global and domestic factors on the tractor export industry. The CAGR for this six-year period, considering both the ups and downs, stands at approximately 1.3%. While this growth rate may appear moderate, it signifies the resilience of the Indian tractor export industry in the face of various economic and global challenges.

The fluctuations in export numbers can be attributed to factors such as changes in global demand, fluctuations in foreign exchange rates, and economic conditions in importing countries. The resurgence in exports in recent years suggests that Indian tractor manufacturers have adapted to these challenges, improved product quality, and expanded their global reach. This export data underscores the importance of international markets for the Indian tractor industry and the need for ongoing efforts to maintain and enhance competitiveness in the global arena. Despite the fluctuations, the industry remains a vital contributor to India's economic growth and global trade.

Tractor exports from India has witnessed a growth of 1.3% CAGR between Fiscal 2019-24



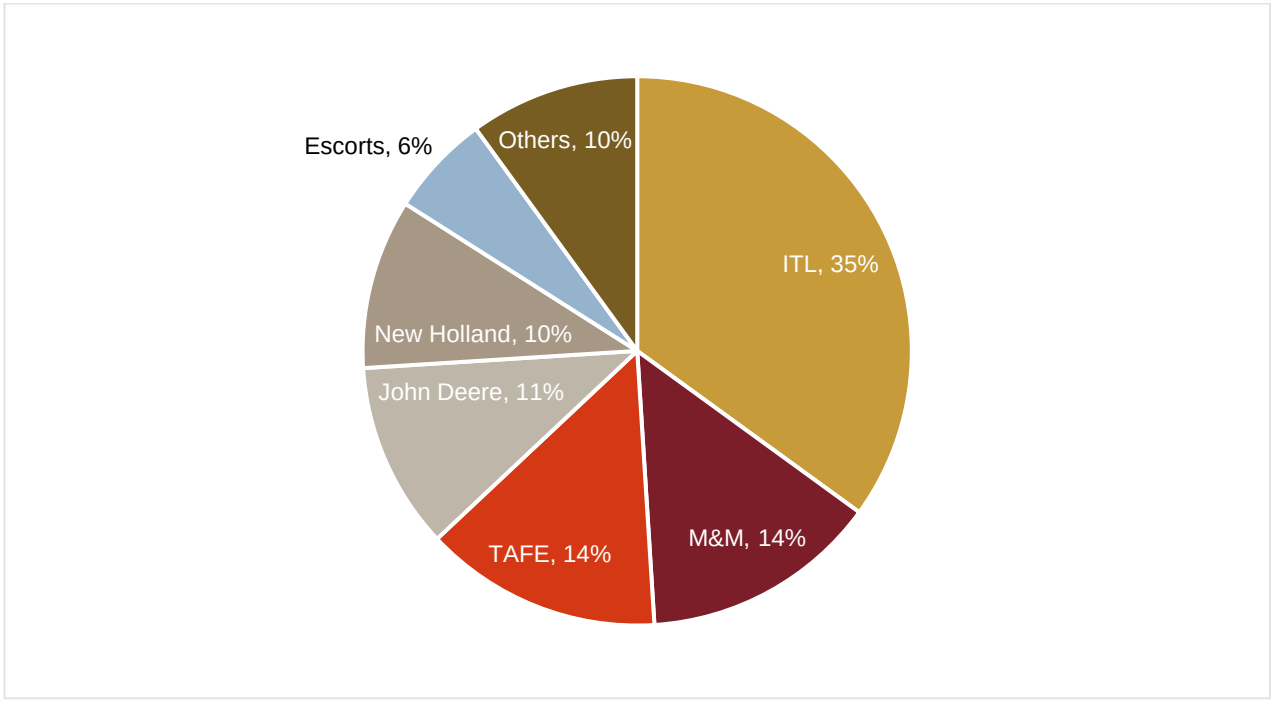
Source: TMA, CRISIL MI&A Consulting

>51 hp segment dominates tractor exports

More than 51 hp tractors accounted for about 62% share in India's tractor export basket for fiscal 2023, the share has come down to 49% in FY24 as demand for lower hp tractors rise. Rising demand for Indian tractors the US and Europe for hobby farming has fuelled demand for lower hp tractors. International tractors limited (ITL) is the largest player in <30 hp tractors while John Deere leads in >51hp tractors.

ITL, John Deere and Escorts have been focusing on growing exports to insulate themselves from the cyclic domestic market demand. Market share of ITL has increased from 25% in fiscal 2021 to 35% in FY24. Escorts reduced exports from its Poland factory and has started exporting from India. Mahindra is a dominant player in exports to the United States and Asian nations. John Deere has been using its Indian manufacturing plant to export to the US, its home country.

Player-wise share of tractor exports (fiscal 2024)



Source: TMA, CRISIL MI&A Consulting

Outlook of Indian tractor industry

Domestic demand to grow 4-6% over next five years on a high base (fiscals 2024 – 2029)

CRISIL Consulting projects domestic tractor sales to expand at 4-6% compound annual growth rate (CAGR) during fiscals 2024 to 2029, after factoring in one to two years of erratic monsoon during the period along with healthy sales expected in the remaining years. From fiscal 2018 to 2023, the industry registered a CAGR of 5% due to healthy sales in fiscals 2017, 2018, 2021 and 2023.

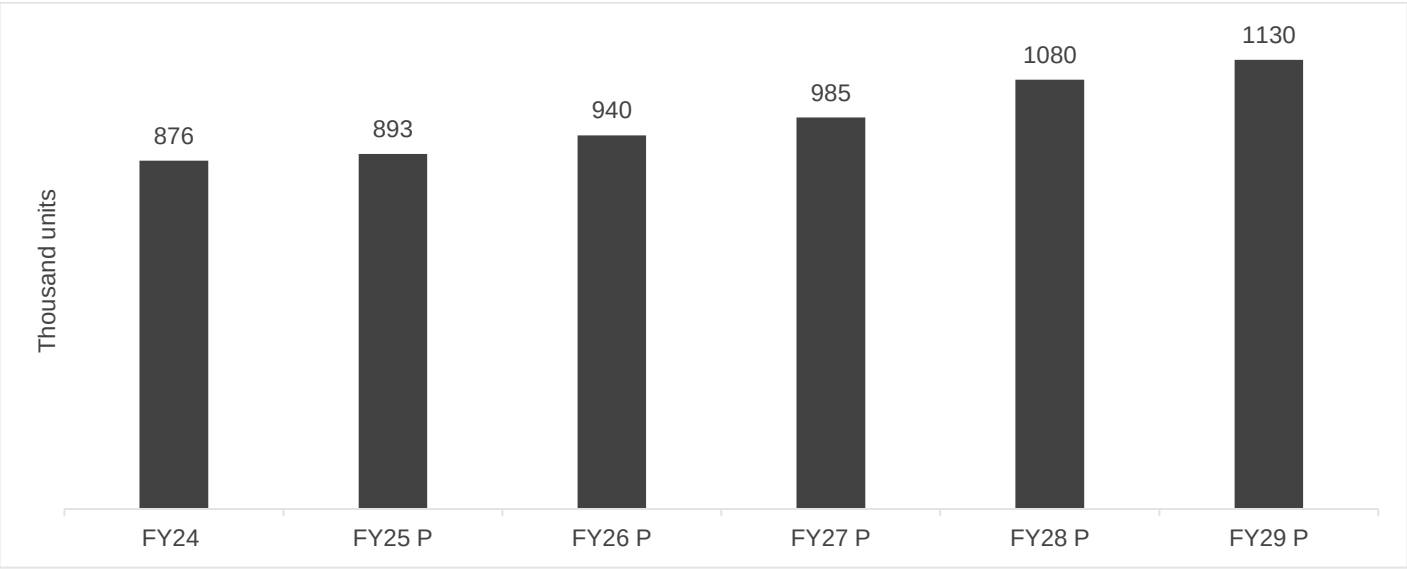
However, anticipated decline in rabi profitability, low subsidy disbursement in the first quarter amid general elections and slower growth in commercial demand to prevent further growth.

In FY25, with IMD's (Indian Meteorological Department) prediction of a normal monsoon season, domestic tractor sales are expected to grow by 2-4% on-year in volume terms. A normal monsoon season is expected to lead to healthy reservoir levels thereby positively impacting farmer sentiments. A 8-10% on-year increase in volumes up for replacement to further support growth in the fiscal. Anticipated healthy rainfall is expected to lead to higher festive demand in the second and third quarters. Healthy reservoir levels to boost rabi acreage and thereby crop profitability which, in turn, is expected to boost tractors sales in the last quarter of the fiscal.

Growth up to fiscal 2029 will be on the back of low tractor penetration in the country (three tractors per 100-hectare area), government's focus on improving farm incomes through various schemes, promotion of farm mechanisation, and investments to improve rural infrastructure.

Tractors is a cyclical industry and has been observed that whenever the industry gets into a downturn, it takes 4-5 quarters for the industry to recover. Thus, assuming that the industry will be impacted by poor monsoon for one to two years between fiscal 2024 and 2029 with the industry taking 4-5 quarters to recover, our long-term assessment suggests that the tractor industry will grow at a CAGR of 4-6%. The growth will be supported by low tractor penetration in India (3 tractors per 100-hectare area); government's focus on improving farm incomes through various schemes, promoting farm mechanization; and investments to improve rural infrastructure.

Tractor industry sales expected to increase 4-6% between fiscals 2024 and 2029



E: Estimated; P: Projected

Source: CRISIL MI&A Consulting

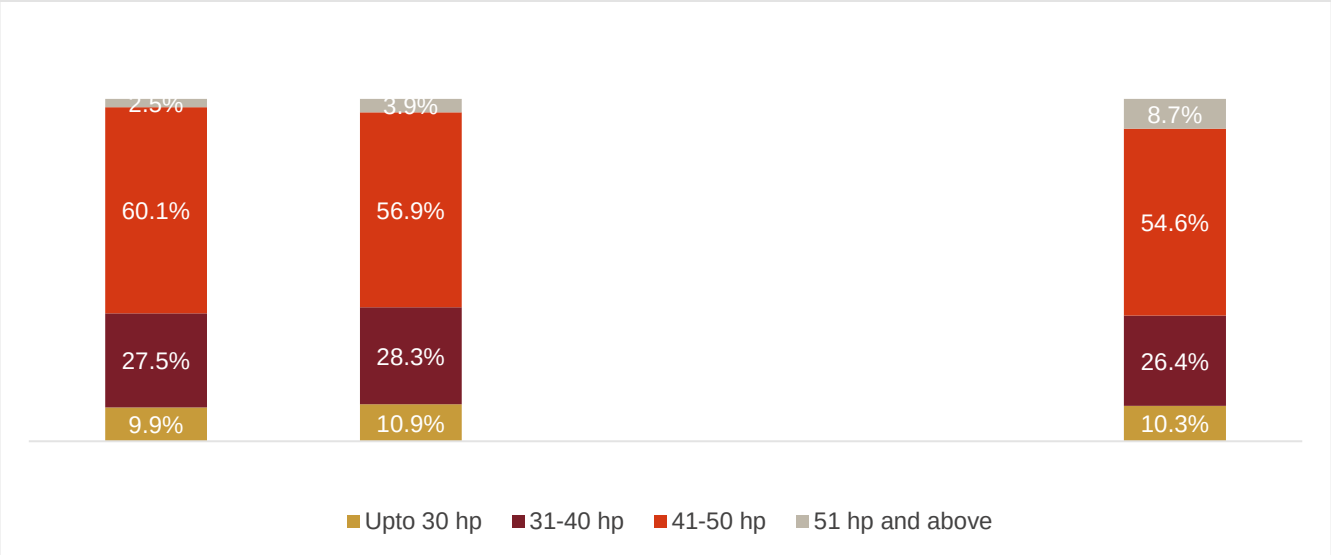
Replacement demand is expected to be higher by 4-6% on-year in fiscal 2024 and rise by 8-10% on-year in fiscal 2025 with healthy sales registered in fiscals 2017 and 2018.

Segment-wise growth outlook (fiscals 2024 – 2029)

CRISIL expects upgradation from 31-40 hp tractors to 41-50 hp tractors over the next five years, as farmers are likely to upgrade to higher hp segments, realising the benefits of mechanization and higher productivity from increased usage of implements along with tractors. Additionally, the growing trend of collaborative farming, increasing commercial usage, and higher irrigation intensity will boost usage of higher hp tractors. However, in case of a decline in farm incomes on account of weak monsoon, farmers tend to shift towards lower hp tractors (below 40 hp). We expect a more gradual movement towards 51 hp and above tractors, as they are less amenable to multipurpose applications (like the 41-50 hp) and the price gap is big (at least 10-15% between a 50 hp and a 55-60 hp tractor since emission norms change at 50 hp).

The market for 70-75 hp tractors is niche and is still evolving in India. These tractors are used mainly for farming along with implements, while 41-50 hp tractors can also be used for haulage and commercial activities such as sand mining. This increases their viability as these can be used for at least 700 hours a year.

Higher hp tractors to see rise in proportion over long run



E: Estimated; P: Projected

Source: CRISIL MI&A Consulting

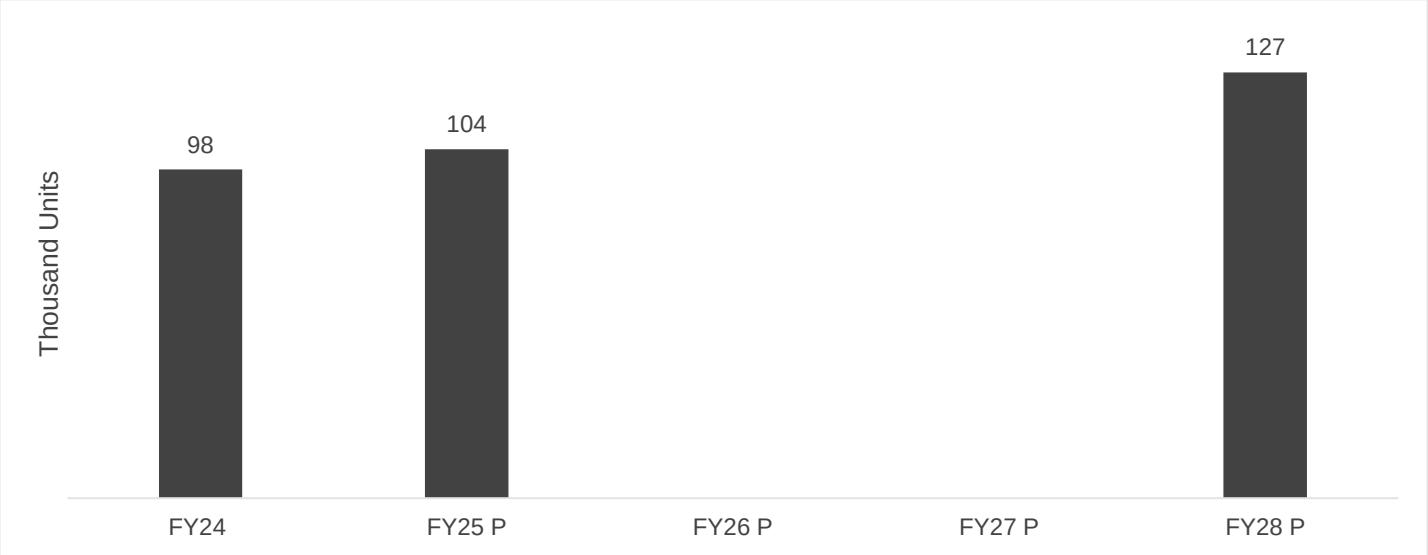
Exports expected to grow at a CAGR of 5-7% from fiscal 2024 to fiscal 2029 amid healthy demand from United States and other Asian and European countries

Exports, accounting for about 10% of the overall tractor sales as of fiscal 2024, are expected to grow by 8-10% on-year to 100,000-110,000 units in fiscal 2025 on a low base of 90,000-100,000 post recording a 23-25% on-year decline in fiscal 2024. Revival in demand from the US, Europe and Asia to further support growth.

Strategic push, such as setting up a base in foreign countries, by players to cater to the global demand would aid export sales. ITL's Solis brand has also been gaining popularity in the European markets. With most of the global companies de-risking exports from China due to the complexities and disruptions in the nation, India has become the natural hedge against Chinese exports. Further, with most of the companies equipped to comply with TREM IV norms, exports have bloomed in the past few years.

The compound annual growth rate (CAGR) between fiscals 2024 and 2029 is expected to be 5-7%. The United States, Europe and Asia are likely to remain the focal regions for long-term exports. Further, with India emerging as an export hub for relatively small tractors (30-75 horsepower/hp), and major companies increasing focus on international markets with the launch of 90-120 hp tractors, we expect sustainable export growth over the next five years. Rising demand for <30 hp tractors for gardening and hobby farming purposes is also expected to support growth.

Exports expected to grow at a CAGR of 5-7% from fiscal 2024 to fiscal 2029



E: Estimated; P: Projected

Source: CRISIL MI&A Consulting

More than 51 hp tractors accounted for about 62% share in India's tractor export basket for fiscal 2023, the share has come down to 49% in FY24 as demand for lower hp tractors rise. Rising demand for Indian tractors the US and Europe for hobby farming has fuelled demand for lower hp tractors. International tractors limited (ITL) is the largest player in <30 hp tractors while John Deere leads in >51hp tractors.

Key growth drivers

Replacement demand expected to be higher

A large part of domestic sales is driven by replacement demand. Typical holding period for a tractor is around 6 to 9 years with most of the tractors being replaced in the country within 7-8 years. Of the overall domestic demand, 50-60% of the sales are replacement demand. For states having high penetration of tractors such as Punjab and Haryana, the replacement demand accounts for about 70-80% of the total sales. While states where farmer incomes are lower as compared to Punjab and Haryana have a lower replacement cycle (higher age tractors)

compared to the industry average.

Replacement demand is expected to be higher by 4-6% on-year in fiscal 2024 and rise by 8-10% on-year in fiscal 2025 with healthy sales registered in fiscals 2017 and 2018.

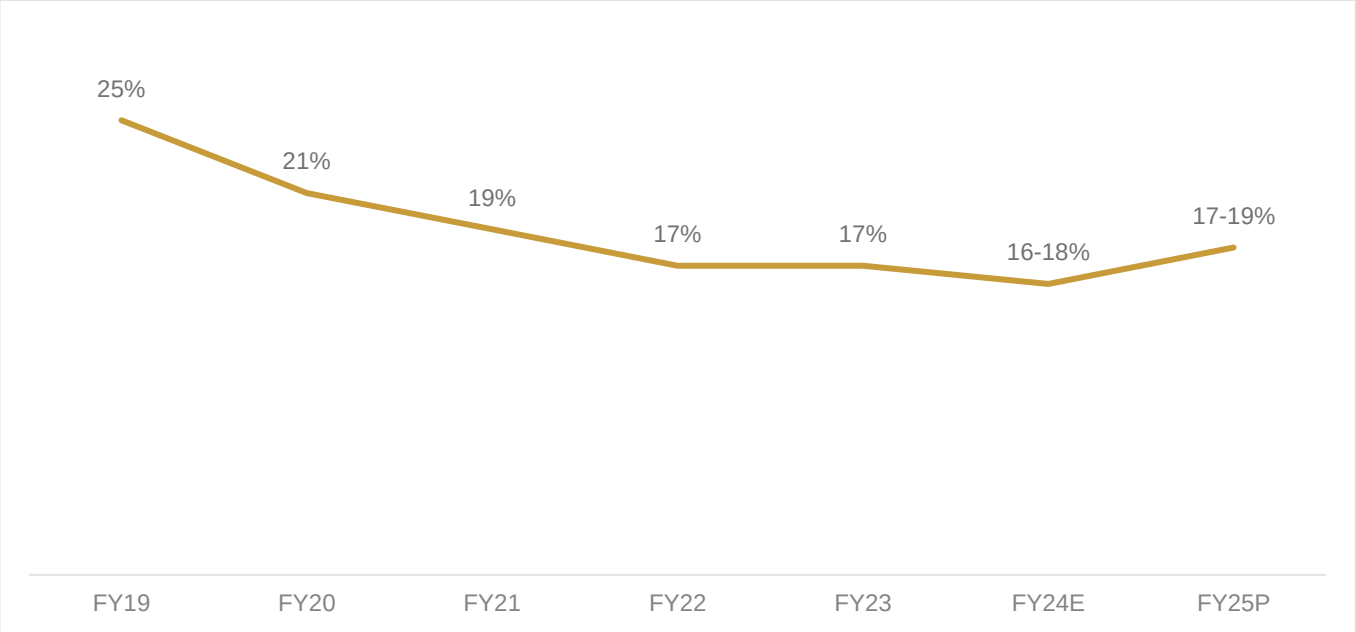
Non-farm usage of tractors on the rise

Tractors are also used in mining, construction and haulage activities. Currently, non-farm usage accounts for 18-23% of demand for tractors. Tractor usage in non-farm activities has been increasing, with the government's focus on improving rural infrastructure. Tractors are used for carrying construction material such as bricks, cement and pipes. Tractors are also being looked at as a better alternative to commercial vehicles, as tractors are more economical, can carry heavy weight, and can also manoeuvre easily on rough, rural roads.

Commercial demand for tractor account for 16-25% of overall tractor demand. Apart from their primary application in agriculture operations, tractors are also used to haul bricks, sand, and farm produce. In poor crop years and in months when there is no agricultural activity, renting out tractors for commercial purposes provides farmers an alternate source of income, thereby proving to be a good hedge. Some tractors are designed specifically for haulage operations and are used exclusively in commercial activities. Based on our industry interactions, tractors are also used as an alternative to pickups for haulage purposes.

Commercial demand is expected to rise at a slower pace in fiscal 2025 with no announcement for the next phase of PMAY-G (with current phase ending in March 2024) coupled with lower investment expected in PMGSY.
In fiscal 2024, we estimate commercial demand to remain rangebound, due to slower demand from construction and sandmining activities. Illegal mining activities have been at a standstill in states such as Bihar, Jharkhand and Uttar Pradesh which is expected to impact commercial demand negatively in fiscal 2025.

Commercial demand expected to remain rangebound in fiscal 2025



E: Estimated; P: Projected

Source: CRISIL MI&A Consulting

Rental model and low-cost tractors key to penetrating fragmented land holdings in India

Despite the huge potential total arable land offers, the fragmented land-holding pattern in India remains a hurdle. With over 80% of land holdings being small and marginal (less than 2 ha), most farmers are unable to afford tractors. They depend on renting tractors or buying small tractors to improve productivity, a trend which is rapidly gaining hold.

Custom Hiring Centres (CHC) are a major component of the government's 'Sub-Mission on Agricultural Mechanisation (SMAM)' policy. These centres maintain farm equipment and machinery which can be rented out, especially to small and marginal farmers who cannot afford them. The state governments of Karnataka, Andhra Pradesh, Madhya Pradesh, Telangana, Odisha and Punjab have been promoting CHCs on public-private partnership (PPP) basis through training, demonstration and financial incentives.

Private sector participation via unique business models is also improving farm mechanisation:

- EM3, a new entrant in the farm machinery industry, is creating a pan-India network of Samadhan Kendras which operate as CHCs, with its focus currently on Madhya Pradesh, Rajasthan and Uttar Pradesh.
- Zamindara Farm Solutions uses a combination of library and radio taxi models to provide farm equipment services, with major operations in Punjab.
- OLAM India is using CHC in collaboration with agri-tech service providers for sugarcane harvesting in Madhya Pradesh.

India's agriculture ministry has developed a farm equipment rental app for Indian farmers, which lets them hire tractors, rotavator and other farm related machinery on rent with flexible tenures.

Highest number of CHCs are found in Punjab, UP, Tamil Nadu and Andhra Pradesh followed by Haryana and Odisha. Under SMAM (Sub-Mission on Agricultural Mechanization), ~13 lakhs of agricultural machinery have been distributed while ~15,180 Custom Hiring Centres have been established.

CHCs face challenges such as lack of awareness among consumers about farm equipment usage, availability issue, high initial investment cost, maintenance of farm machinery, and providing equipment specific to local cropping patterns. Monitoring of CHCs remains a major challenge. However, involvement of key stakeholders and introduction of favourable schemes and policies can make the CHC concept successful in India.

Over next few years (fiscals 2024 to 2029), the following structural factors to support growth:

- The government's objective of supporting farmers through direct income support and improvement in land productivity via soil health cards. These measures should improve farmers' crop yields and affordability, improve purchasing capacity and support tractor penetration.
- The government's renewed thrust on enhancing irrigation intensity and making the nation more drought-proof is expected to support agriculture growth and increase mechanisation.
- Custom-hiring centres (CHC) are being promoted through government incentives with number of CHCs rising at a CAGR of 18% from fiscal 2017 to fiscal 2023. The trend is catching up in Karnataka, Madhya Pradesh, Andhra Pradesh, Telangana, and Orissa and encouraging farmers to lease tractors. States such as Karnataka, Madhya Pradesh, Andhra Pradesh and Punjab are promoting such hiring centres through training, demonstrations and financial incentives.

- Tractor rental services made available on mobile applications by manufacturers -- such as Jfarm by TAFE and Trringo by Mahindra -- to prop up demand for tractors in long term. Global companies such as Hello Tractors in association with Aeris, a California-based technology company, is also planning to launch a pay-as-you-use tractor service for Indian farmers.
- Expected rise in commercial demand will boost sales in the coming years.
- Rising demand for lower hp tractor to cater to the small and marginal farm holds to drive growth.
- With increasing government focus on infrastructure, demand for haulage is also expected to rise boosting tractor sales.
- Higher government focus on agriculture and on farmers to lead to healthy crop prices impacting tractor demand positively.

8. Review and outlook of Indian passenger vehicle industry

Review of Indian domestic PV industry (fiscal 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 pandemic and subsequent nationwide lockdown.

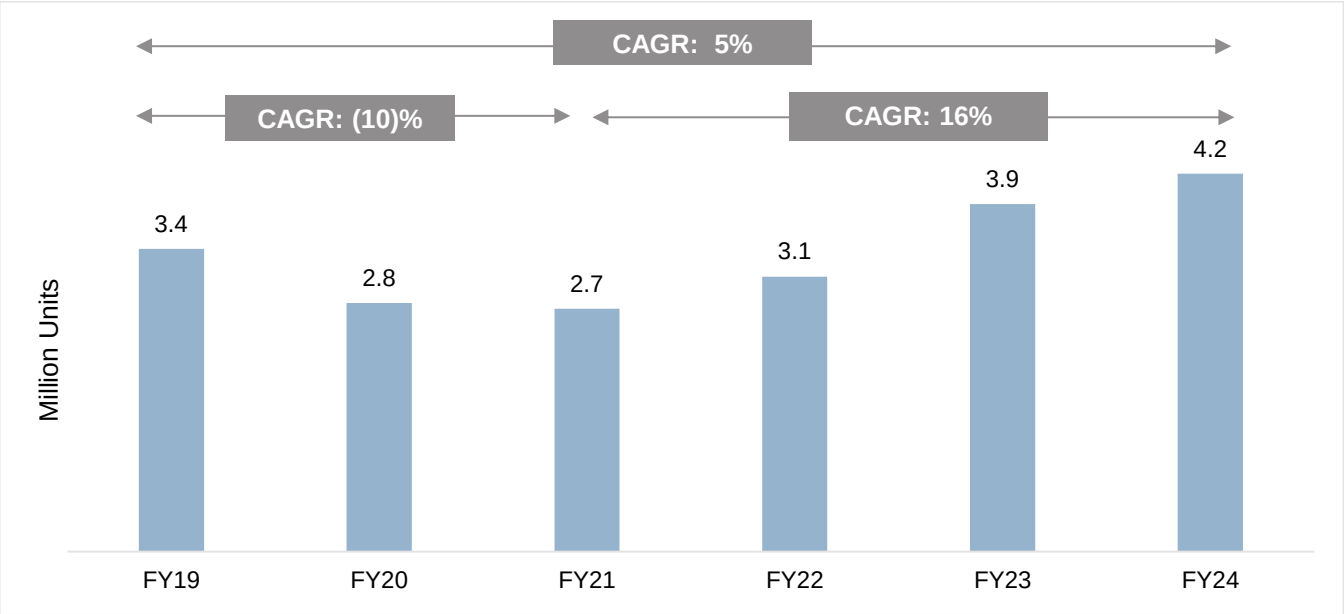
In fiscal 2021, domestic sales continued to be impacted by the first wave of the pandemic. A nation-wide lockdown, reduced mobility, and supply chain constraints leading to production cuts weighed on annual sales. Despite some improvement in sales with the reopening of the economy and increased demand 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. 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.

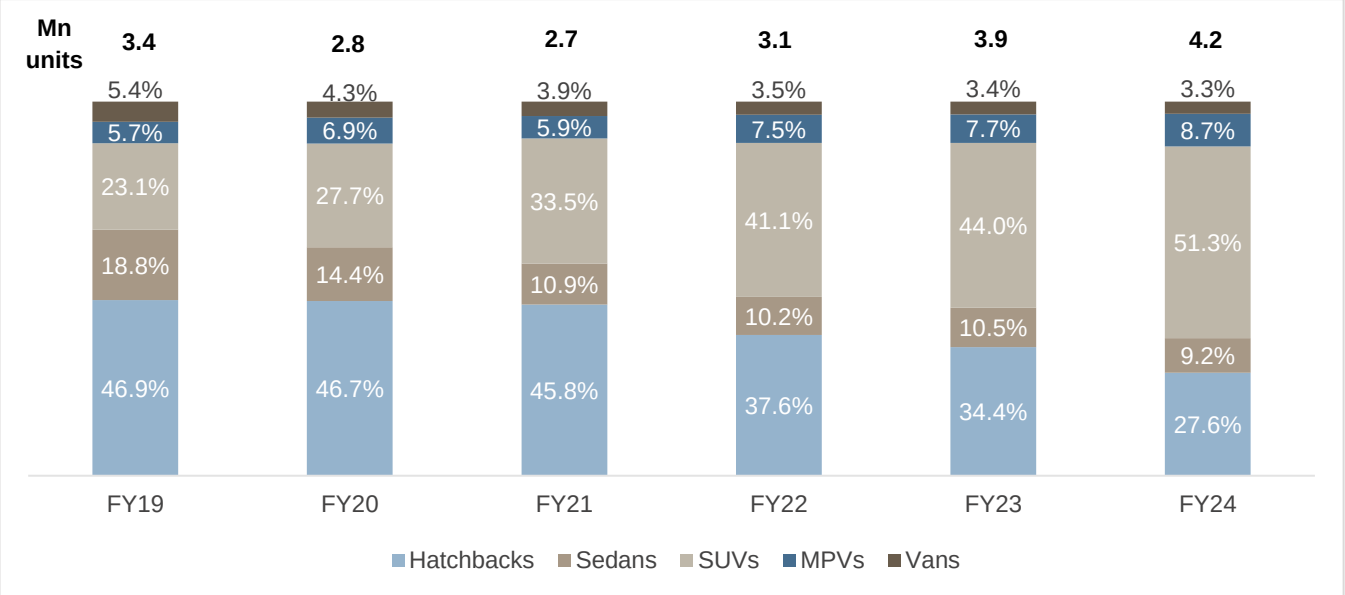
Segmental shifts amidst premiumization

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 and 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



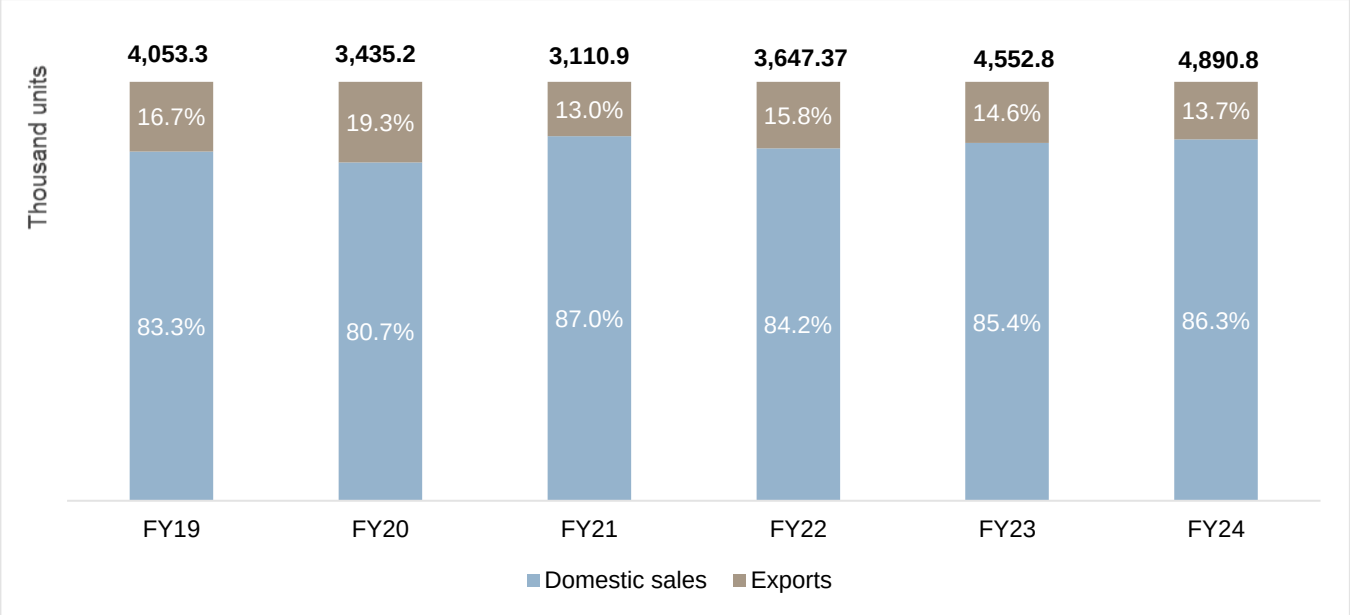
Note: Figures above bars are the sales volumes.
Source: SIAM, CRISIL MI&A

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.

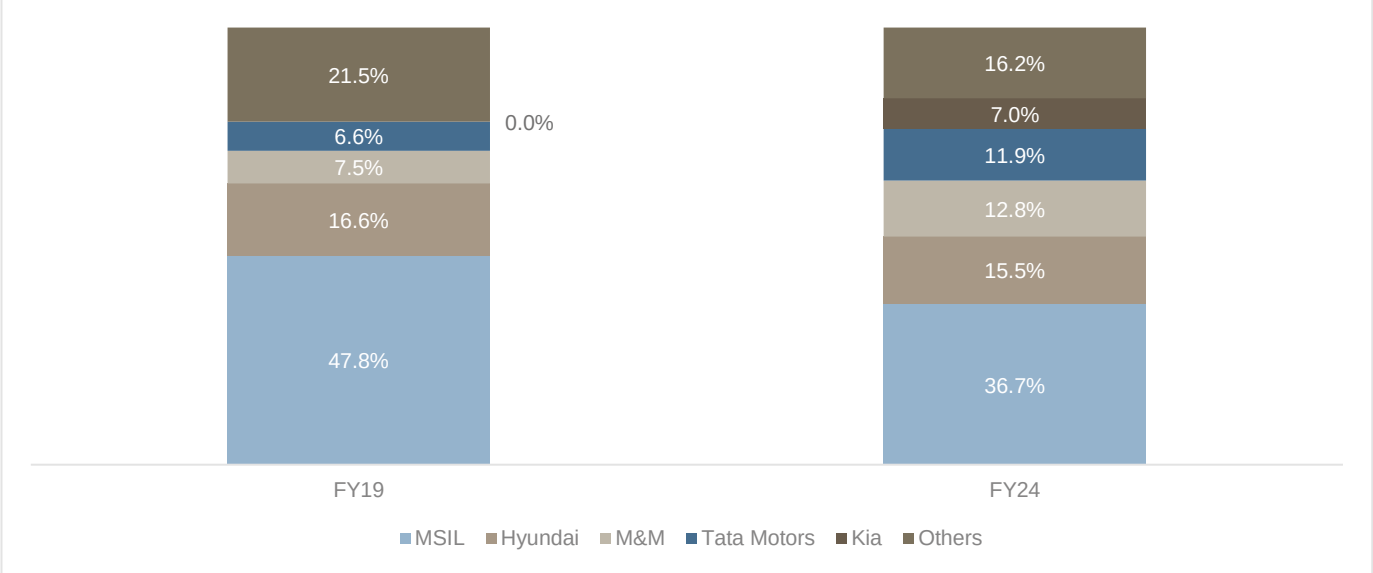
In fiscal 2020, though, the export share had risen to 19% as OEMs refocused on export markets. Stagnating domestic sales over the past three years resulted in foreign automobile manufacturers such as Ford, General Motors, and Volkswagen increasing their focus on exports, thereby improving their capacity 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 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)



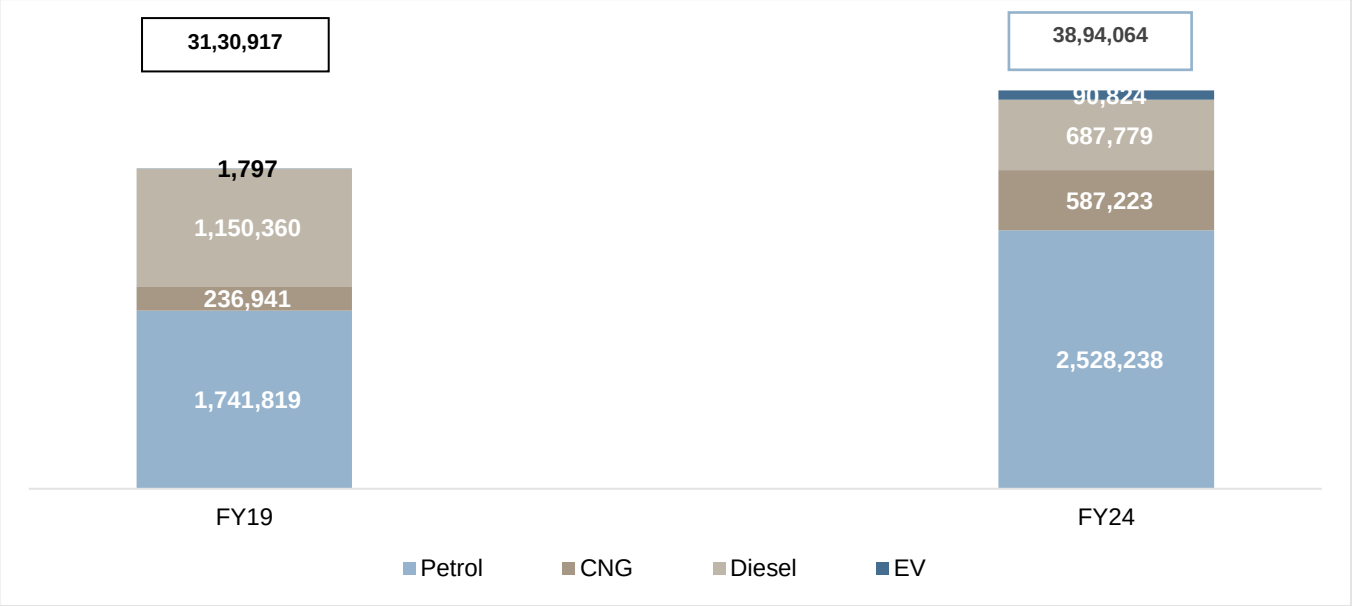
Source: SIAM, CRISIL MI&A

OEM wise split for Conventional Fuel vehicle retails



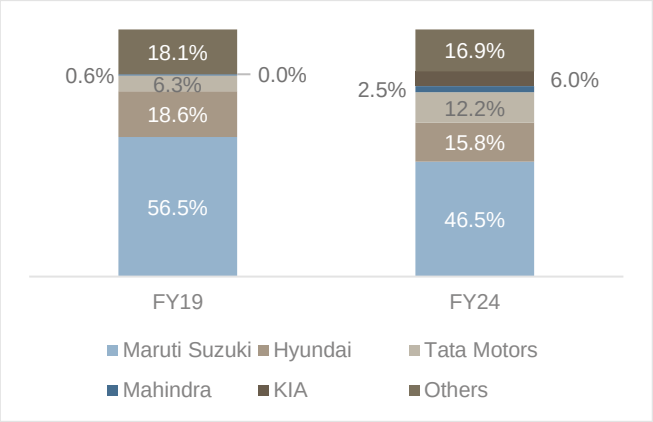
Source: VAHAN, CRISIL MI&A

Fuel wise split for vehicle retails

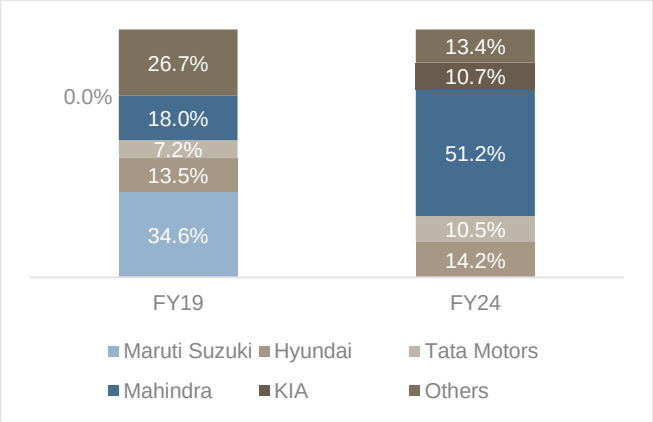


Source: VAHAN, CRISIL MI&A

OEM wise split for Petrol vehicle retails

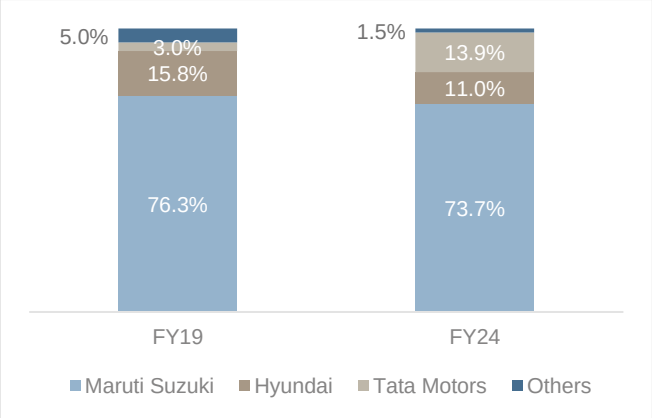


OEM wise split for Diesel vehicle retails

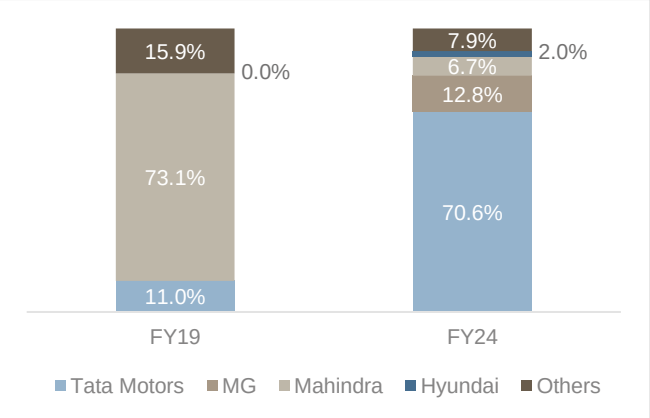


Source: VAHAN, CRISIL MI&A

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.

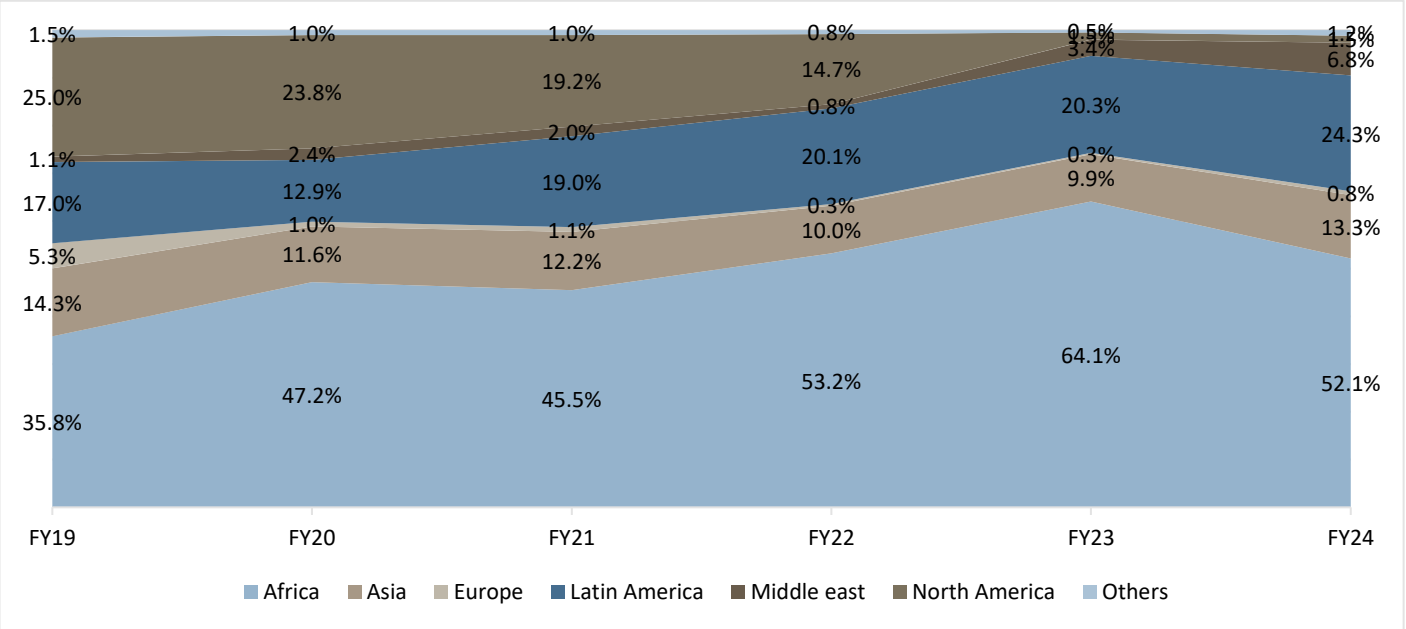
Review of key export destinations

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 and 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

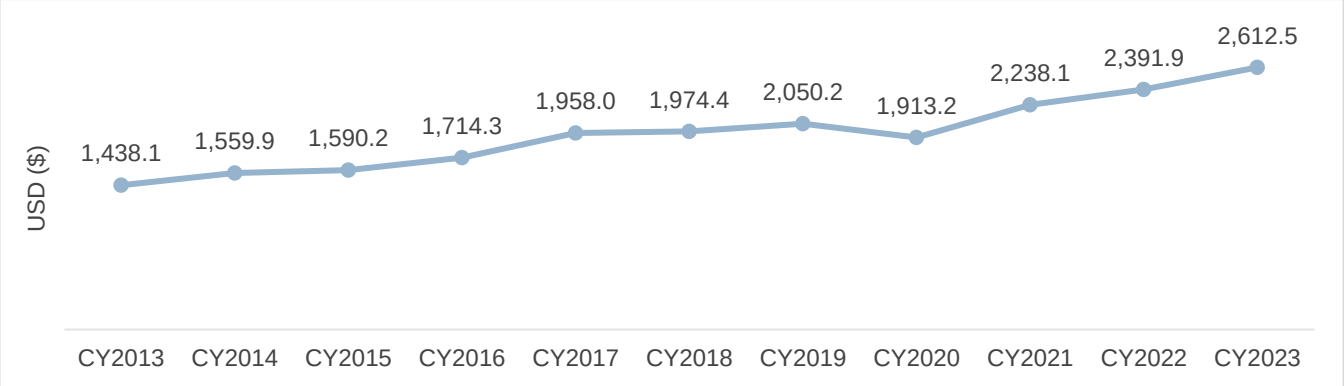
Key historic regulatory/macroeconomic trends and growth drivers for domestic sales

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



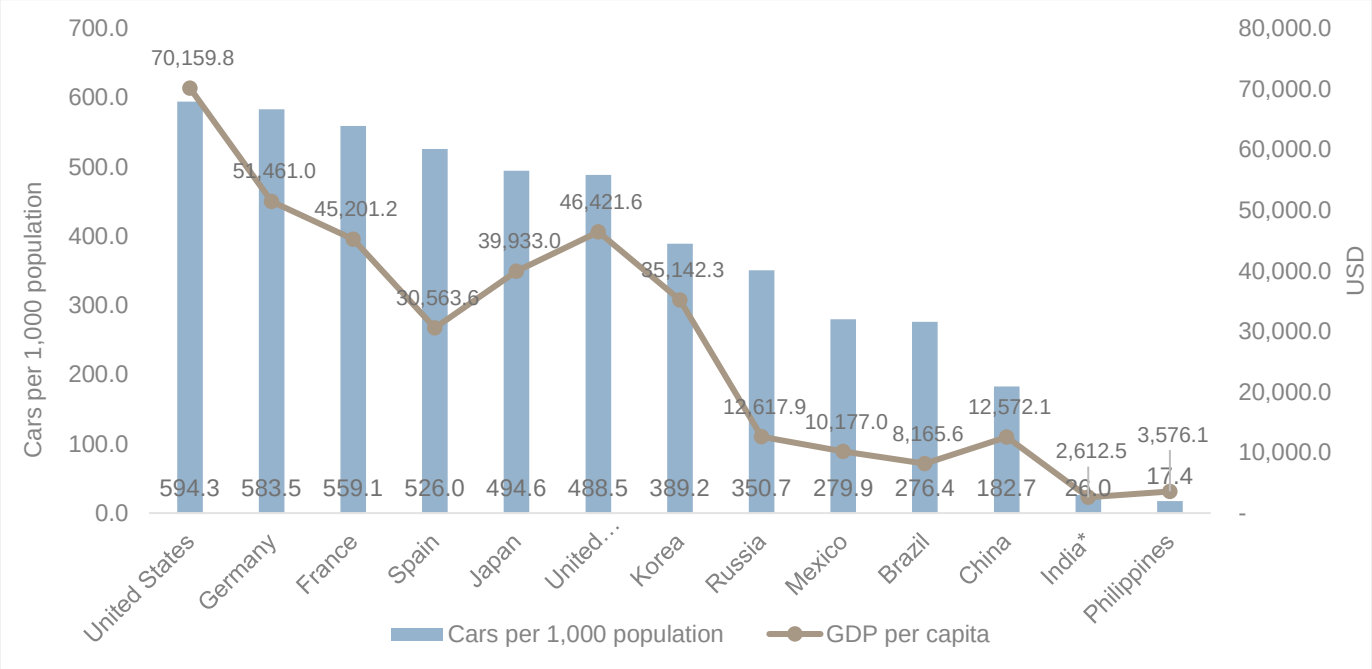
Source: IMF, CRISIL MI&A

Going ahead, International Monetary Fund (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.

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

Regulations/ safety norms

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. These mandatory norms increase the capital expenditure of the auto OEMs and in turn significantly impact the industry's profitability. Currently BS-VI norms are being followed in India.

The PV industry has been conforming to safety regulations (such as mandatory installation of ABS/CBS, airbags, manual lock in anti-locking systems, seat belt warning system, speed warning system etc.) in new models. This has increased the manufacturing cost per vehicle. However, most car models, other than low-end ones, were already equipped with these safety instruments and for them, the impact will be subdued.

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. The norms resulted in price hike for vehicles across segments owing to the addition of new technologies to meet new emission regulations.

Safety norms

Bharat New Car Assessment Program (BNCAP) was launched by Ministry of Road Transport and Highways (MoRTH) on August 22nd, 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.

BNCAP crash testing follows similar methodology followed in the Global New Car Assessment Programme (GNCAP). The testing method aims to offer star ratings to cars based on their performance in crash testing. The

BNCAP regime has formulated a new standard, AIS 197 and will offer star ratings on a scale of five, for both adult occupant protection (AOP) as well as child occupant protection (COP) offered by a car in a crash test assessment.

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 to reduce the price parity with pre-GST regime. The government has been levying high tax on diesel vehicles to discourage use. Consumers prefer diesel vehicles due to the better mileage as against petrol variants. 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)

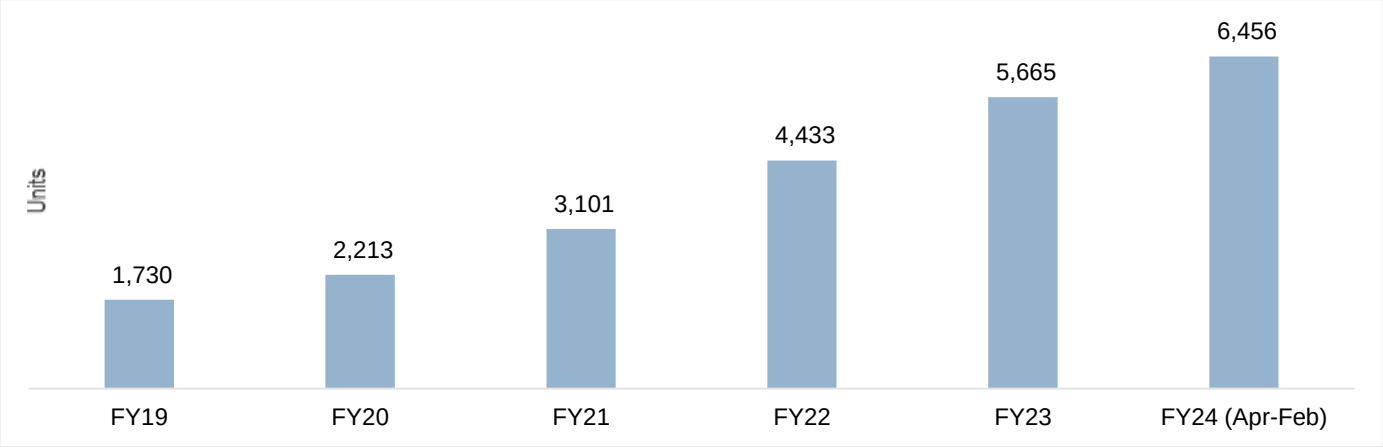
In fiscal 2023, the government had increased the price of domestic natural gas to $6.1 per metric million British thermal unit (mmBtu) in first half of fiscal 2023 and increased further 40% to $8.57 per mmBtu in second half of fiscal 2023 following elevated gas prices at international level on account 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.

As of fiscal 2023, a total of 21.9 thousand km length of gas pipeline was operational under multiple commissioned City Gas Distribution (CGD) projects, and a total of 33.1 thousand km stretch was under construction. A target of setting 17,700 CNG stations in urban and rural areas by 2030 was also set. In fiscal 2023, an additional 1,232 new stations were added, taking the total number of CNG stations to 5,665. Between fiscal 2019 and 2023, the number of CNG stations grew at a CAGR of 34.5%.

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



Note: For FY24 - April 2023 to February 2024 period as updated on PPAC

Source: Petroleum Planning and 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.

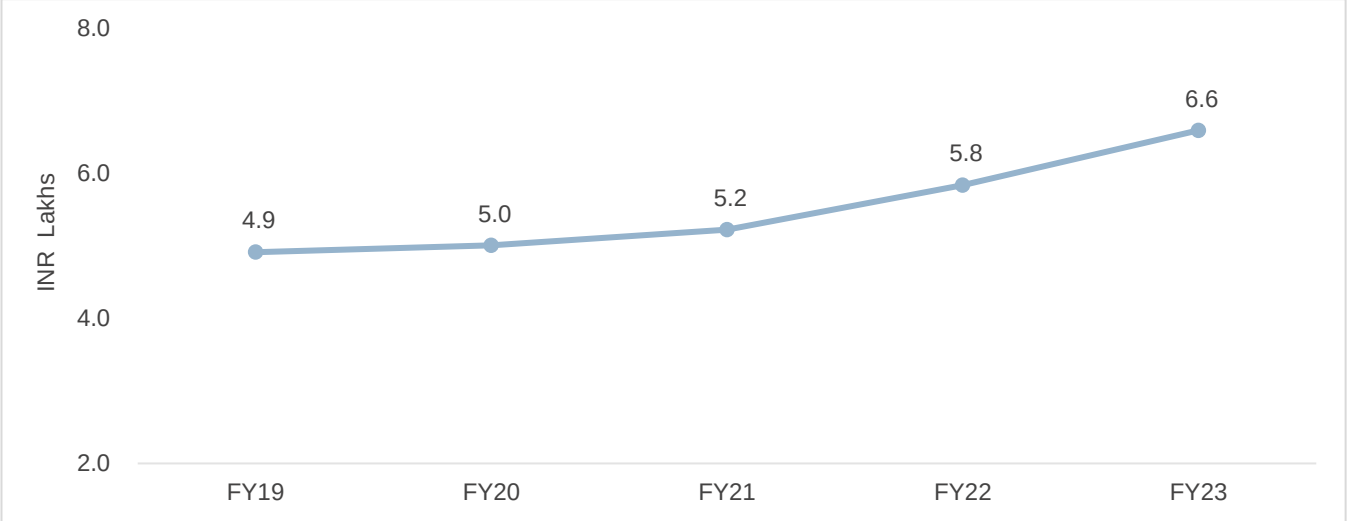
Premiumization trend

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. During the same period, share of SUVs increased from 23.1% in fiscal 2019 to 44% in fiscal 2023.

This was majorly driven by shift in consumer sentiments towards newly launched feature rich vehicles in the SUV segment.

Increase in spending from the upper middle class after pandemic led to more purchases of SUVs supported by higher number of models 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.

Trend in average vehicle price (ASP)



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

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 Motor India introduced sunroof in their i10 and i20 hatchbacks 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.

Over and above these features, industry has also started offering connectivity as an add on feature in their latest offerings especially in the top variants. These connectivity features enable seamless interaction between the user and the vehicle through their application. Few of the features include remote start stop, remote HVAC (Heating Ventilation and Air Conditioning) control, real time location services etc. Such features are available in vehicles like MG Hector, Hyundai Venue, Creta, Tata Harrier/Safari, Mahindra XUV700, Maruti Grand Vitara to name a few.

Moreover, apart from the standard safety features, many of the OEMs are also offering advanced driver assistance and safety features through ADAS (Advanced Driver Assistance System) technology. The basic ADAS features include blind spot detection, emergency braking, cruise control, lane departure warning etc. These additional features are currently being offered in premium vehicles like Honda City, Kia Seltos, MG Hector, Hyundai Creta, Mahindra XUV700 and Tata Safari. Currently most OEMs in the mass market[1] offer level 2 (L2) ADAS capability through their in house ADAS technology like Hyundai SmartSense and Honda SENSING.

All these additional features have also aided the premiumization within the passenger vehicle industry.

[1] Mass market refers to OEMs whose domestic sales, exports and production data is captured monthly and annually by SIAM

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.

Current 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 and) 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.

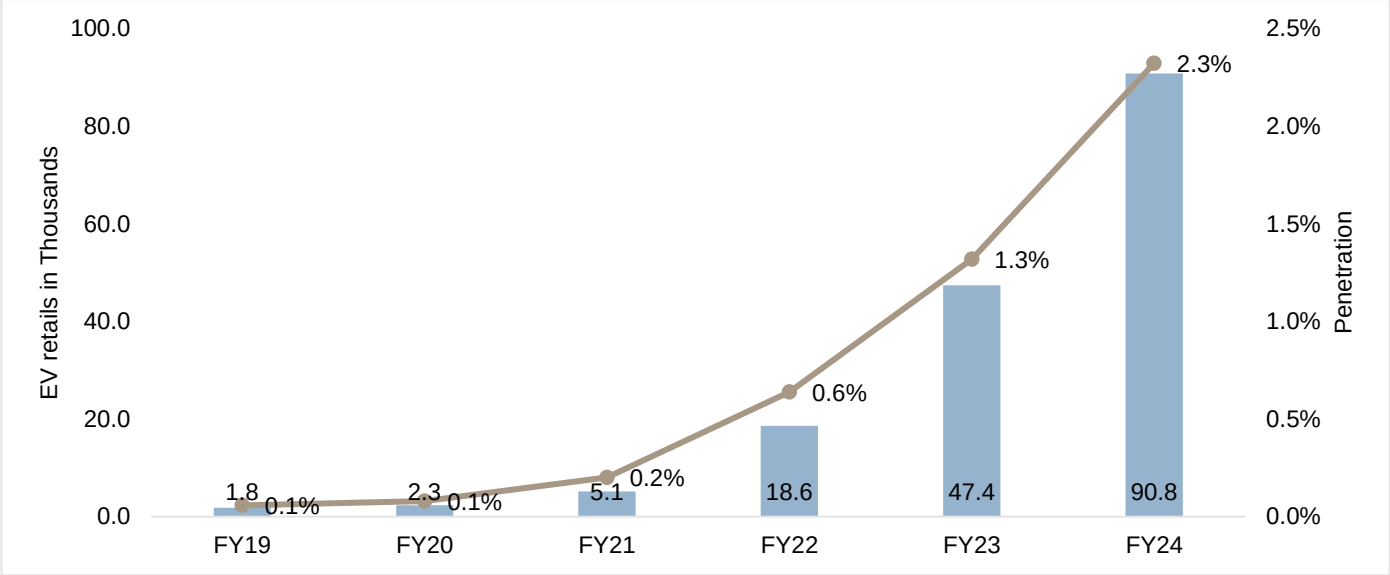
These schemes alongside the Production Linked Incentive (PLI) schemes, scrappage policy as well as the Make in India initiative is setting up the roadmap for widespread EV manufacturing and adoption. (Policies have been covered in detail in earlier sections)

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 and 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 domestic PV Industry (fiscal 2024 to 2029)

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 and 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.

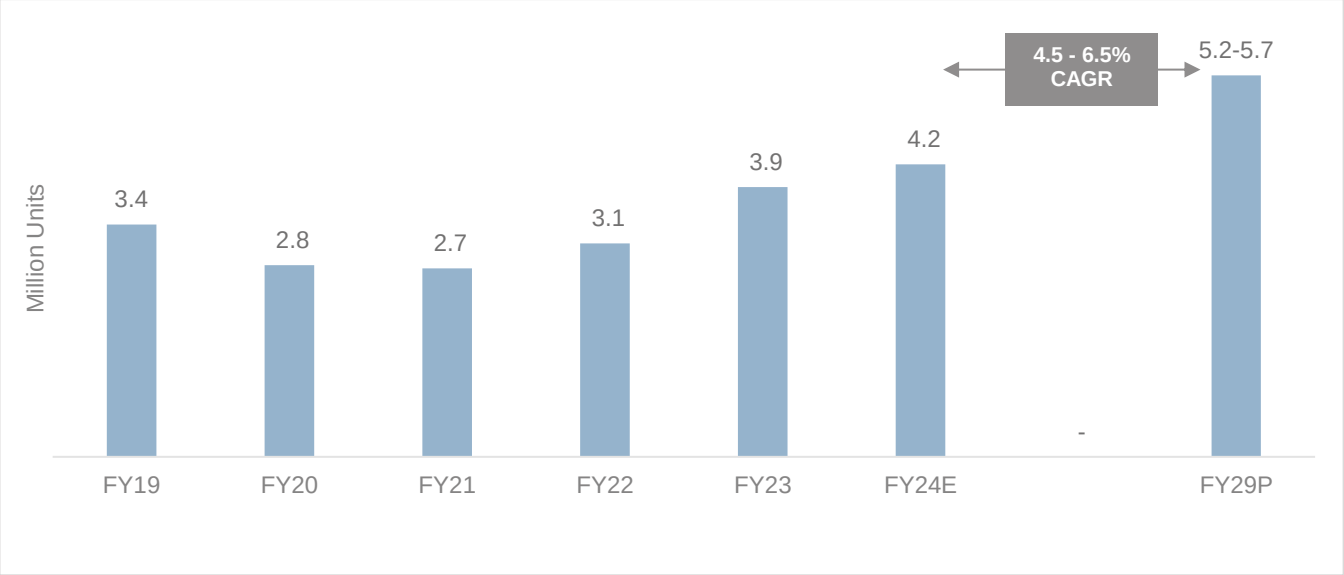
The financing scenario is projected to remain favourable for the industry and will lend further support amidst expanding financing reach and high Loan to Value (LTV) levels. Moreover, after multiple rate hikes in the last 2 years, a rate cut of 25-50 bps is expected in the near term keeping the interest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

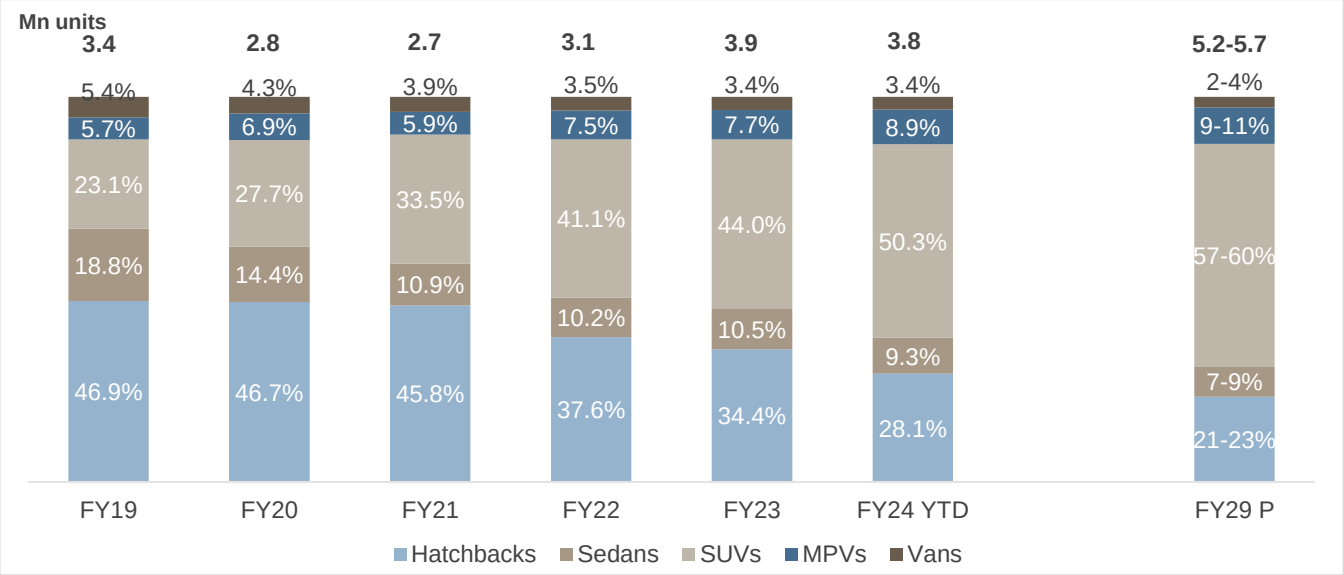
Growth in the domestic industry is expected to be led by the SUV and MPV segments while the hatchback, sedan and vans segments are expected to clock muted growth going ahead.

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

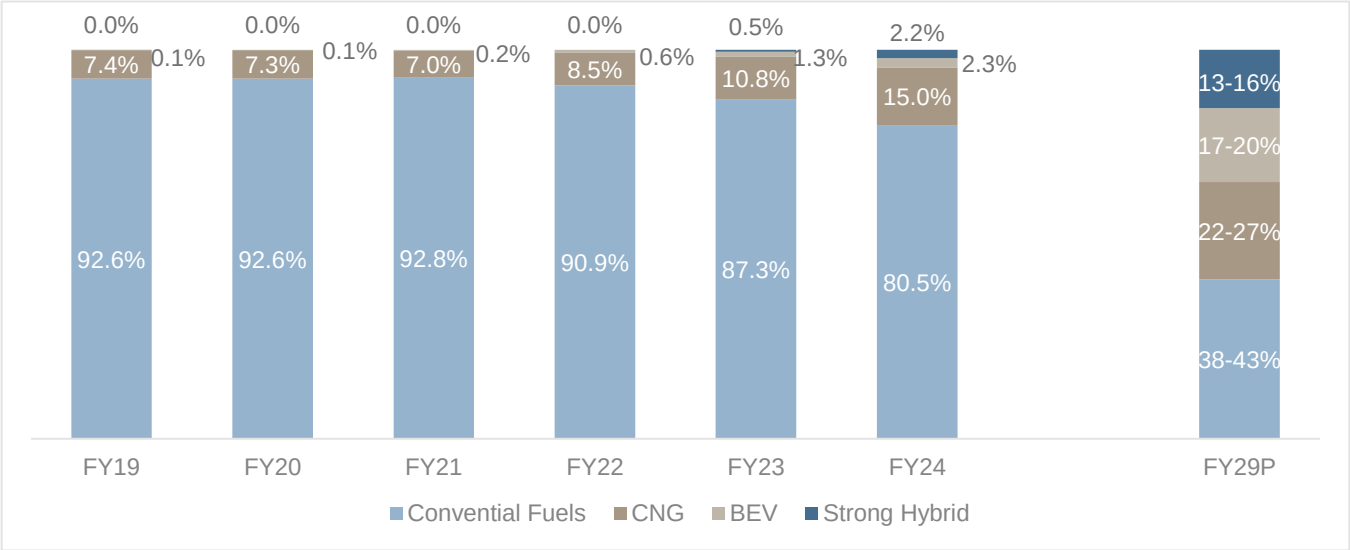


Source: SIAM, CRISIL MI&A

Outlook on the Powertrain mix of the industry

Indian domestic passenger vehicle industry, which was completely dominated by the conventional fuels, has witnessed fast acceptance of alternate fuels especially in the last 2/3 years. In fact, the share of CNG powertrain doubled to 15% while EV (2.3% share) and the latest addition, strong hybrids (2.2% share) expanded their presence in the vehicle retails. Going forward, CRISIL MI&A expects the share of alternate fuel vehicles to witness a multi-fold growth while the conventional fuel vehicle's share will slide.

Powertrain wise Outlook of the industry



Note: Strong hybrid: Vehicles having a combustion engine as well as an electric motor. The vehicle can be powered by the engine, by the battery, or by both simultaneously. Battery of the vehicle is charged by the combustion engine and not by an external power source. Telangana and Lakshadweep retail data is not available on VAHAN.

Source: VAHAN, CRISIL MI&A

By fiscal 2029, CRISIL MI&A projects the share of CNG variants to rise to 22-27% from the 15% share clocked in fiscal 2024. Healthy growth in CNG station infrastructure will primarily thrust the growth of CNG vehicle share. Amidst the government's push coupled with the support of City Gas Distribution- CGD players, completion of commitments under the CGD rounds is expected to pick up pace. Thus, CNG station infrastructure is projected to rise at a healthy pace till 2030.

Over and above the expansion in station infrastructure, the prices of CNG fuel are expected to remain subdued as per the Kirit Parikh panel recommendations, thus providing an added boost to the CNG vehicle demand.

This has also led to expansion of the vehicle portfolio by players, especially in the premium segments like premium hatchbacks, compact SUVs and mid-size SUVs wherein they have announced future launches. This will lend further incentive to the CNG buyers.

Electrification is another trend witnessed in the Indian domestic passenger vehicle market in the last 2/3 years. Plethora of vehicle launches, expanding charging infrastructure and continued government support will aid further growth of electrification in India going ahead. CRISIL MI&A expects the EV penetration to reach 17-20% (approx. 1 million units) by fiscal 2029 from the 2.3% penetration (~90 k units) seen in fiscal 2024.

Off the low base, EV charging infrastructure is projected to grow at 58-63% CAGR in the next 5 years (covered in detail in the EV subsection). Moreover, most OEMs have planned 5-8 EV launches each in the medium term to cater to the expanding EV demand. These vehicle launches are expected to be across subsegments as well as across body types catering to multiple price points and in turn multiple customer bases. Additionally, the expected reduction in battery prices and increased production efficiency will lend further support in optimizing the EV prices. Furthermore, entry of global players like Tesla and VinFast will also aid electrification in the longer term.

However, for EVs, range anxiety, limited charging infrastructure, import dependency on certain components, higher import duties and underdeveloped local supply chain are few bottlenecks.

The recent entry of strong hybrid vehicles such as Maruti Suzuki Grand Vitara, Maruti Suzuki Invicto, Toyota HyRyder, Toyota Hycross and Honda City have witnessed fast acceptance due improved mileage, environmental benefits coupled with absence of EV concerns like range anxiety, limited charging infrastructure, etc. In the last 2 years, strong hybrid powertrains have grabbed ~2% share of the annual retails of the PV industry.

In the long-term horizon, CRISIL MI&A projects higher traction for strong hybrids, further buoyed by attractive hybrid offerings, OEM focus, infrastructure availability and government support. Proposed launches[2] of strong hybrid variants of popular models by Maruti Suzuki like Fronx, Baleno, Brezza, Swift and Dzire, Renault Duster, Toyota Fortuner, Nissan X-trail will aid the demand from customers. By fiscal 2029, strong hybrids are projected to contribute about 13-16% to the industry retails.

PV Exports Outlook for India

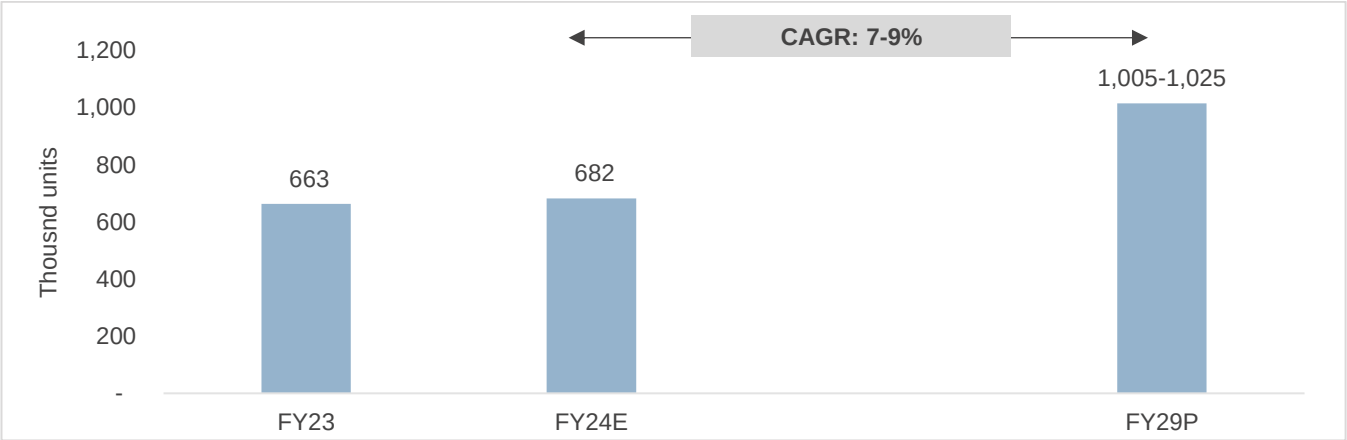
Passenger vehicle exports from India is expected grow at 3.1% in fiscal 2024 and at a CAGR of 7-9% between fiscals 2024 and 2029. Anticipated economic growth in key export regions along with push from OEMs will make India the base of exports for certain models, which in turn will boost exports. While 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.

[2] Not confirmed by OEMs, information available from other secondary sources

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)



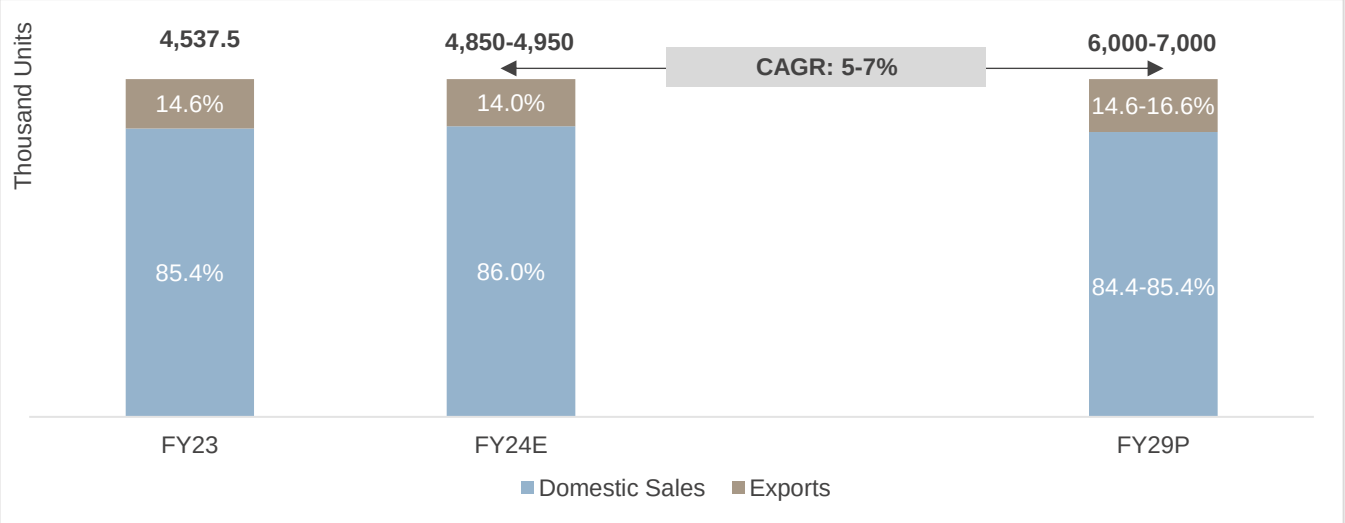
Source: CRISIL MI&A

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

Estimated penetration of Electric PV segment wise by FY29

As it stands, the FAME-II subsidy is incentivised only towards commercial use. No benefits are provided to personal car owners.

In case of commercial applications such as cab aggregators, as of fiscal 2023, the total cost of acquisition (TOA) of an EV is 10% higher as compared with diesel, 19% with petrol and 12% with CNG. However, due to high annual running, the TCO for EVs is 14% lower when compared with diesel taxies and 18% when compared with petrol taxies and is almost at par with CNG cabs. However, due to heavy running of the vehicles, the TCO of EVs for cab aggregators is lower for EVs compared with diesel alternatives but higher than CNG alternatives even in fiscal 2023. By fiscal 2026, CRISIL MI&A Consulting expects the TCO for EVs to be lower than diesel alternatives and marginally lower than CNG. The lower battery cost is expected to offset the lack of FAME subsidy and will help maintain competitiveness of BEVs against diesel and CNG variants for cab aggregators.

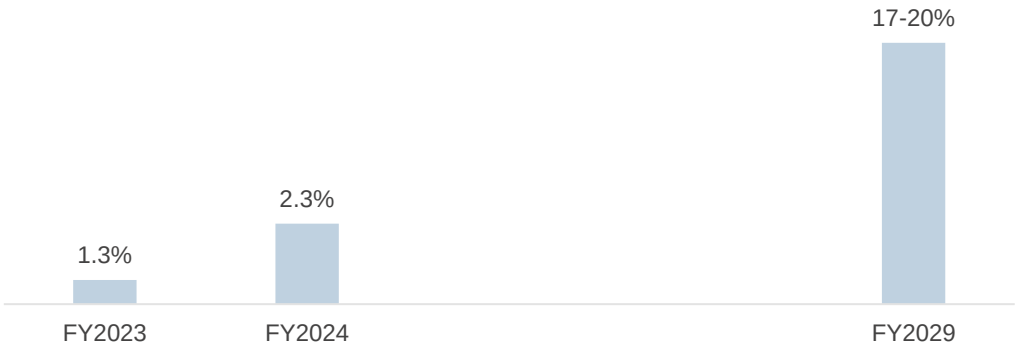
CRISIL MI&A Consulting believes the lack of charging infrastructure, range anxiety and lack of large OEM presence is hindering EV adoption in India. The taxi segment accounts for 10-15% of sales within passenger cars, Within the taxi segment, cab aggregators are expected to lead EV adoption, resulting in an estimated 25-31% adoption of EVs within this segment by fiscal 2027 (considering that adequate infrastructure is available by fiscal 2027).

The TOA and TCO of electric personal cars are still higher compared with the petrol alternative due to their lower running costs. Therefore, EVs are currently not a viable use-case. However, the gap is expected to shrink in fiscal 2029, driving EV adoption in personal usage segment. In addition, availability of charging infrastructure and range, especially for intercity travel, are likely to be key deciding factors for EV adoption in the personal car segment.

Hence, CRISIL MI&A Consulting expects the share of EVs in total passenger car sales to reach 12-14% in fiscal 2029. Penetration in fiscal 2023 was 1.2%.

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

9. Review and outlook of the Indian commercial vehicle industry

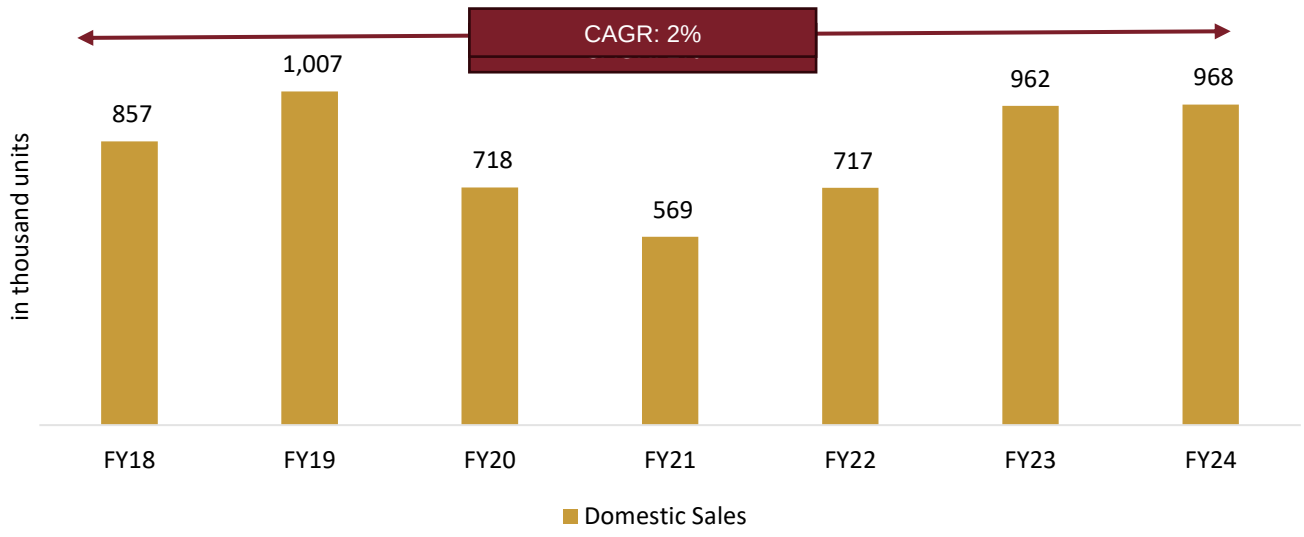
Review of Indian commercial vehicle industry

Between fiscals 2018 and 2024, domestic CV sales logged a CAGR of 2%. The CV industry exhibited a noteworthy recovery in fiscal year 2023, achieving a remarkable growth rate of 35%, albeit on a low base, and reaching 96% of the pre-pandemic levels observed in fiscal year 2019. This resurgence can be attributed to pent-up replacement demand, improved transporter profitability, and the pick-up in capex that had been hampered during the preceding 2-3 years due to economic stagnation and the disruptive impact of the pandemic.

In fiscals 2018 and 2019 witnessed strong recovery as compared to 2016-17 and a healthy 18-20% growth, supported by the government's focus on road and housing infrastructure development. In fiscal 2020, the industry witnessed a sharp de-growth on a high base, due to inventory adjustment on account of the transition to BS-VI emission norms. In fiscal 2020, demand for buses was impacted due to safety regulations (emergency exit doors, fire detection and suppression, escape hatches and emergency lighting).

The pandemic brought the entire economy to a grinding halt when a nationwide lockdown was declared to contain its spread, thus affecting the profitability and sustainability of transporters due to lack of availability of freight demand. The industry, however, gained momentum afterwards as consumption demand and industry activity started gaining pace.

Review of commercial vehicle industry



Source: SIAM, CRISIL MI&A

Segmental Trends

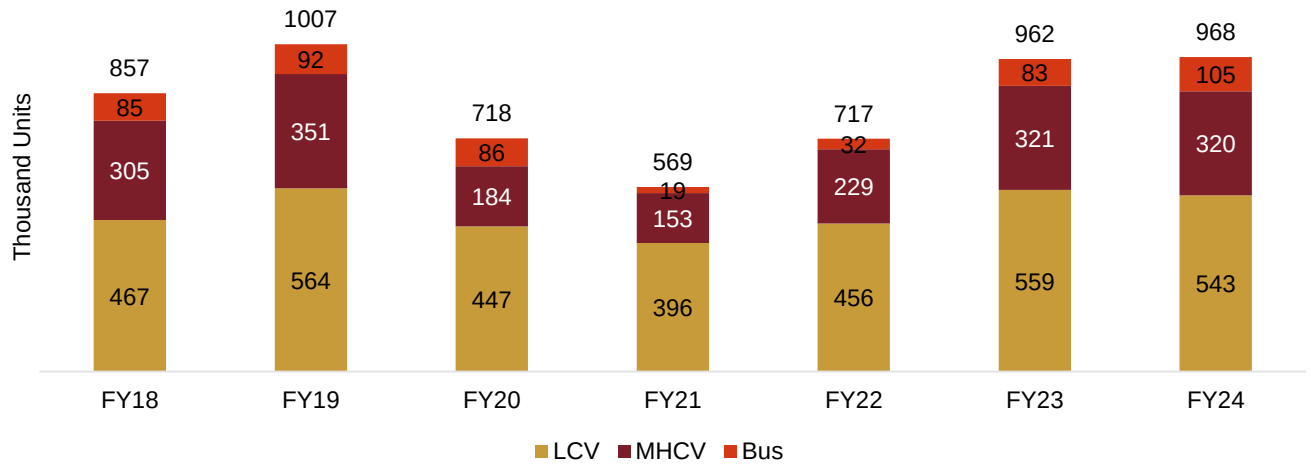
During fiscal 2018-2021, industry sales contracted at 13% CAGR amidst the 28% drop in fiscal 2020 followed by further 21% contraction seen during fiscal 2021 due to the pandemic. Over the last five years, the industry weathered major challenges on account of events such as demonetization, NBFC crisis, implementation of axle load norms, changes to insurance norms and transition to BS-VI emission norms. A culmination of these multiple factors, particularly post the second half of fiscal 2019, resulted in a dampening of demand for CVs.

During the pandemic, due to the limited mobility, demand for buses was hit significantly contracting at 39% CAGR during fiscal 2018-2021 period. In fiscal 2020, demand for buses was impacted due to safety regulations (emergency exit doors, fire detection and suppression, escape hatches and emergency lighting) that led to an increase of ~Rs 50,000 in the cost of ownership. This was after a price hike of ~Rs 15,000 due to mandatory installation of vehicle tracking system and panic buttons in January 2019.

After the price rise, demand for buses was also hit by weakening private consumption in fiscal 2020, hampering demand from tourist bus operators and inter-city travel operators. Weak corporate hiring and production cuts in manufacturing also impacted demand for corporate staff buses. However, school and route permit buses have shown some resilience in fiscal 2020. Demand from state transport undertakings (STU) ramped up in the second half of fiscal 2020 as STUs looked to replace much of their older fleet before the BS-VI price rise.

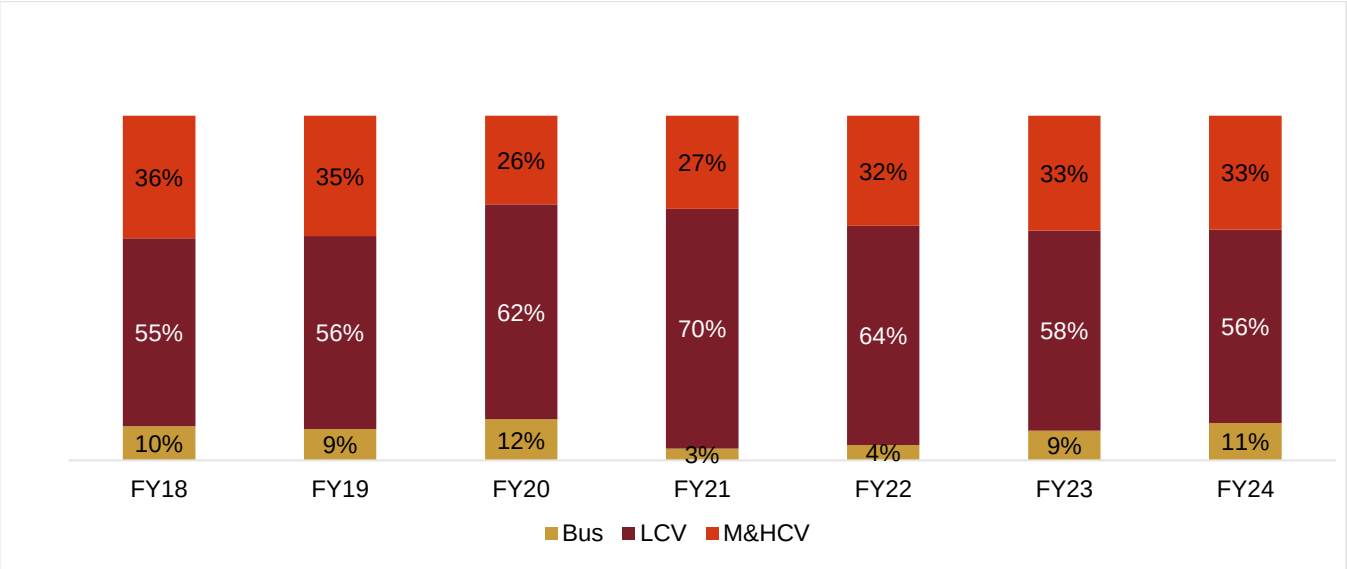
On the other hand, the continued demand for LCVs for e commerce and last mile delivery restricted its fall to 5% and thus extending its share to 69% during fiscal 2021. Moreover, LCVs are typically replaced every 6-8 years, and vehicles purchased between 2011 and 2013 were due for replacement in 2019. Given its strong sales in fiscal years 2011 and 2013, the sub-one-ton segment witnessed particularly strong replacement demand. This strategic replacement cycle contributed to stable sales in fiscal year 2019 and avoided a significant drop in LCV sales in fiscal year 2020 following robust sales in fiscal years 2018 and 2019. Even during the pandemic, a lesser impact of the pandemic on rural areas and improved rural sentiment resulted in LCVs outperforming M&HCVs.

Segment-wise share in domestic sales



Source: SIAM, CRISIL MI&A

Segment-wise share in domestic sales (%)



Source: SIAM, CRISIL MI&A

The commercial vehicle (CV) sales for fiscal year 2024 witnessed a growth of 1%. This trajectory is underpinned by increased government spending and replacement demand. In FY2023, the CV industry exhibited remarkable recovery with a growth rate of 34%, reaching 96% of pre-pandemic levels.

The Light Commercial Vehicle (LCV) witnessed a decrease of (3)% in fiscal year 2024, after an all-time high in sales in the previous fiscal. The lower utilization of vehicles coupled with the increase in asset costs lead to a decline in sales. The Medium and Heavy Commercial Vehicle (MHCV) segment witnessed a stable outlook in the fiscal year 2024. In the fiscal year 2024, the bus sales sector witnessed substantial growth to 27%. This growth is anticipated to be bolstered by robust replacement demand; wherein older buses will be replaced with newer ones. In fiscal 2025, we expect CV sales to grow at a moderate rate of (2)-2% due to the impact of the upcoming union elections and the cyclical nature of the industry.

The demand from the key end-user segments coupled with the pent-up replacement demand helped the industry to mark the growth. The CV industry exhibited a strong recovery in the fiscal year 2023, achieving a remarkable growth rate of 34%, albeit on a low base, and reaching 96% of the pre-pandemic levels observed in the fiscal year 2019. This resurgence can be attributed to pent-up replacement demand, improved transporter profitability, and pick-up in capex that had been hampered during the preceding 2-3 years due to economic stagnation and the disruptive impact of the pandemic.

In the first half of fiscal 2024 the CNG prices dropped by ~4% and the diesel prices by ~3% respectively on-year. In the LCV segment and the MHCV segment, the proportion of CNG vehicles decreased marginally by 1%. The CNG model availability was one of the major factors that lead to the drop as there were supply side constraints caused by OEMs transitioning to BS VI stage II emission standards leading to the unavailability of the LCV CNG models.

The adoption of Compressed Natural Gas (CNG) in the Light Commercial Vehicle (LCV) segment faced challenges in fiscal year 2023 due to a significant 57% increase in CNG prices relative to a minor 2% rise in diesel prices. As a result, the gap between CNG and diesel prices narrowed, leading to a reduction in the (TCO) benefits of CNG models. Consequently, the LCV segment observed a marginal decline in the share of CNG vehicles, indicating possible shifts in consumer preferences.

In fiscal 2024, the CNG penetration in LCV was 11% and in the Intermediate Medium and Heavy Goods Vehicle Category (IMHGV) increased to 11%. In FY 2023, the share of CNG models in the LCV market dropped from 15% in the previous fiscal year to 12%. Similarly, in the Intermediate Medium and Heavy Goods Vehicle (IMHGV) category, the share of CNG MHGV vehicles sold reduced from 11% in fiscal year 2022 to approximately 5% of total sales in FY 2023. The increased cost of CNG compared to diesel impacted demand, prompting consumers to opt for diesel-powered vehicles instead.

Despite these challenges, the long-term prospects for CNG adoption remain promising. Fluctuating fuel prices and potential government incentives for eco-friendly alternatives could potentially reignite 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.

In fiscal 2024, domestic CV industry is dominated by the LCV goods segment contributing to more than half of the vehicle sales. The larger M&HCV segment which includes ICV, MCV, MAV Haulage, Tractor trailers and Tippers contributes to 33%. The rest is contributed by buses in the CV segment accounting for 9%.

From this low base, industry witnessed a strong bounce back during fiscal 2021-2024 period. LCV sales witnessed a 19% CAGR rebounding to 99% of pre-COVID heights. The postponement of replacement volumes since fiscal year 2020 has further supported LCV demand volumes in fiscal year 2024.

In fiscal year 2023, the MHCV segment exhibited significant growth, expanding at a rate of 40%, although this was compared against a low base in fiscal year 2022. This recovery brought MHCV sales to approximately 92% of the level recorded in fiscal year 2019, a notable milestone. The resurgence in economic activities across various sectors played a pivotal role in driving this recovery.

In fiscal year 2023, the bus sales sector witnessed an extraordinary growth rate of 160% and in fiscal 2024, it witnessed a growth of 27%. However, it is essential to contextualize this growth as it was achieved on a low base, indicating a significant decline in bus sales during the previous fiscal year (fiscal 2022). The sharp growth in fiscal 2024 was primarily propelled by the resumption of schools and offices, along with a robust recovery in the tourism sector, contributing to a strong rebound in bus sales.

While bus sales more than doubled every fiscal off a very low base fuelled by robust replacement demand and urbanization trends. There has been unprecedented demand for buses. Buses are sold primarily to schools, corporates which use it to ferry staff and for tours and travel companies who use it for intercity and interstate travel. School demand has picked up after the pandemic. Schools have been apprehensive these last few years due to Covid and lockdowns however now there seems to be no fears in this regard and schools are preponing purchases, there seems to be a lot of pent-up demand from schools. Corporates have also started to operate in full swing work from office mode with a few IT giants making work from office mandatory this has led to considerable demand for staff service buses as well.

Demand Drivers

Increasing freight rates to aid in materialization of deferred demand

In fiscal year 2024, fuel prices constituted approximately 55% of transporter costs, exerting a considerable influence on their overall profitability. During this period, diesel prices experienced a modest increase of around 2%. Concurrently, freight rates also rose by an estimated 6%, signalling improved transporter profitability and heightened demand for freight services. These favourable factors are expected to boost Commercial Vehicle (CV) sales, as the industry capitalizes on the increased demand in the transportation sector.

Shift in fuel types of CVs to CNG

The adoption of Compressed Natural Gas (CNG) in the Light Commercial Vehicle (LCV) segment faced challenges in fiscal year 2024 due to a significant 57% increase in CNG prices relative to a minor 2% rise in diesel prices. As a result, the gap between CNG and diesel prices narrowed, leading to a reduction in the Total Cost of Ownership (TCO) benefits of CNG models. Consequently, the LCV segment observed a marginal decline in the share of CNG vehicles, indicating possible shifts in consumer preferences.

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In fiscal 2023, with the Kirit Parikh committee recommendations on CNG pricing, CNG prices have declined by 4% to Rs 74/kg. This decline in prices will open up the difference in total cost of ownership between Diesel and CNG favouring CNG transition.

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Despite these challenges, the long-term prospects for CNG adoption remain promising. Fluctuating fuel prices and potential government incentives for eco-friendly alternatives could potentially reignite 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.

Stable agricultural output

Over fiscal 2024 to 2028, CRISIL projects 3-4% gross value added (GVA) growth in agriculture. In fiscal 2023, Agri GVA grew at 4% over last year and expected to remain steady in coming years.

In the current fiscal, kharif sowing was initially delayed due to the delayed monsoon. However, sowing has picked up in recent months. Moreover, higher MSP allocation for fiscal 2024 and good prices in mandis have maintained the positivity on-ground. Going ahead, the rainfall progress and spread to play a key role for the current kharif cycle. The progress of the monsoon and its impact on rural demand especially for two-wheelers and tractors, remain as key monitorable.

Healthy industrial growth

The Indian industry's GVA grew at a tepid pace of 3.7% between fiscals 2018-2023. After ~5% growth in fiscal 2019, industrial GVA witnessed contraction in the next two years amidst the unfavourable macroeconomic scenario and the Covid pandemic.

From the low base of fiscal 2021, industrial GVA bounced back rapidly in fiscal 2022 and grew at ~11.5%. Gradual improvement continued in fiscal 2023 at 4.4%. Over the next five-year period (fiscal 2023-2028), industry GVA is expected to be robust driven by the government's focus on 'Make in India'. Moreover, improvement in infrastructure and higher expected corporate expenditure is likely to support the capex cycle going forward post fiscal 2023.

Gati Shakti

PM GatiShakti National Master Plan (PMGS-NMP) was launched on 13th October 2021 for providing multimodal connectivity infrastructure to various economic zones. Cabinet Committee on Economic Affairs (CCEA) accorded

approval for the implementation of PM GatiShakti National Master Plan on 21st October 2021. Essentially a digital platform to bring 16 Ministries including Railways and Roadways together for integrated planning and coordinated implementation of infrastructure connectivity projects.The multi-modal connectivity will provide integrated and seamless connectivity for movement of people, goods and services from one mode of transport to another. It will facilitate the last mile connectivity of infrastructure and also reduce travel time for people.

PM Gati Shakti will incorporate the infrastructure schemes of various Ministries and State Governments like Bharatmala, Sagarmala, inland waterways, dry/land ports, UDAN etc. Economic Zones like textile clusters, pharmaceutical clusters, defence corridors, electronic parks, industrial corridors, fishing clusters, agri zones will be covered to improve connectivity and make Indian businesses more competitive. It will also leverage technology extensively including spatial planning tools with ISRO (Indian Space Research Organisation) imagery developed by BiSAG-N (Bhaskaracharya National Institute for Space Applications and Geoinformatics).

Focus on infrastructure and higher mining production to bolster tipper demand

The budgeted capex allocation for infrastructure ministries for fiscal 2024 has shown a 28% increase over fiscal 2023 RE (revised estimates) to Rs. 18.6 lakh crore. Execution by the National Highways Authority of India (NHAI) will reach up to ~14-15 km/day in fiscal 2027, as against ~11 km/day in fiscal 2021, aided by the Bharatmala project. Projects such as Sagarmala and investments in various irrigation projects will further drive MHCV demand. We expect coal production to expand at ~4.5-5.5% CAGR between fiscals 2023 and 2028, while iron ore mining will also likely grow at ~3.5-4.5% CAGR during this period, aiding tipper demand.

Capacity utilization and profitability of transporters

Utilization of transporters depends on:

- Availability of freight - driven by growth in industrial and agricultural production and port traffic
- Regulations on vehicle age, weight, permit and tax norms
- Improvements in road infrastructure, which improve the turnaround time

A rise in utilization translates into better cash flow for transporters and, hence, augurs well for CV sales.

Factors influencing transporter profitability are:

- Freight rates and capacity utilization
- Bargaining power
- Fuel cost and fuel efficiency
- Capital cost
- Agency commission and wage cost
- Operating and maintenance costs, such as tyre prices and toll rates

The dynamics of the domestic freight transport industry (DFTS) play an important role in determining demand for CVs.

Replacement demand

LCVs are typically replaced every 6-8 years, and vehicles purchased between fiscal years 2011 and 2013 were due for replacement in fiscal year 2019. Replacement demand is expected to be particularly high for the sub-one-tonne

segment, given its robust sales during fiscal years 2011 and 2013. This strategic replacement cycle contributed to stable sales in fiscal year 2019 and prevented a major decline in LCV sales in fiscal year 2020 after robust sales in fiscal years 2018 and 2019. The postponement of replacement volumes since fiscal year 2020 has further supported LCV demand volumes in fiscal year 2023.

JNNURM – I (Jawaharlal Nehru National Urban Renewal Mission) buses, sold during the peak seasons of fiscals 2011 and 2012, are expected to be replaced once funds are released by the central and state governments for purchase. This replacement is expected to gain pace now, aiding long-term MCV bus growth. The government's mandate to replace private vehicles (such as vans) with school buses in some cities, is also expected to augur well.

Also, the centre’s scrappage policy is likely to attract 6,00,000-6,50,000 MHCV vehicles for scrapping there by driving the replacement demand.

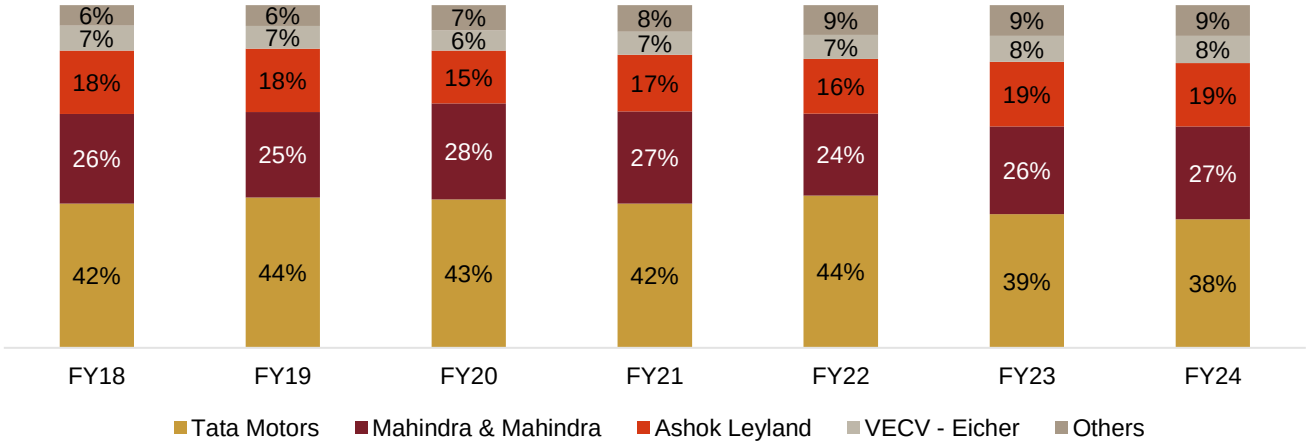
Scrappage policy

MoRTH, in August 2018, considered incentivizing the scrapping of vehicles sold before April 2005 (15 years old). After deliberations on the modalities on implementation of the norm, the government currently aims to promote vehicle scrapping by exempting registration charges for truck purchases made after scrapping older trucks. To incentivize scrappage of older vehicles, the government has increased the registration charges for older vehicles and increased stringency of fitness tests. These will entail higher costs for owners of older vehicles. Hence, by disincentivizing the ownership of older vehicles, the government expects the scrappage of older vehicles to increase. We expect the impact of the norms to be limited on additional scrappage (apart from vehicles scrapped in the normal course of business). If, through higher incentives from the government and OEMs, transporters can be incentivized to scrap vehicles older than 15 years, we expect 6,00,000-6,50,000 MHCVs to be available for scrapping.

Competitive Scenario

Tata Motors leads in the CVs segment in terms of market share, followed by Mahindra and Mahindra and Ashok Leyland (ALL). Over the years, from a high base, Tata Motors has lost some ground to Mahindra and VE Commercial Vehicles Ltd.

Overall CV industry split by market share across OEMs

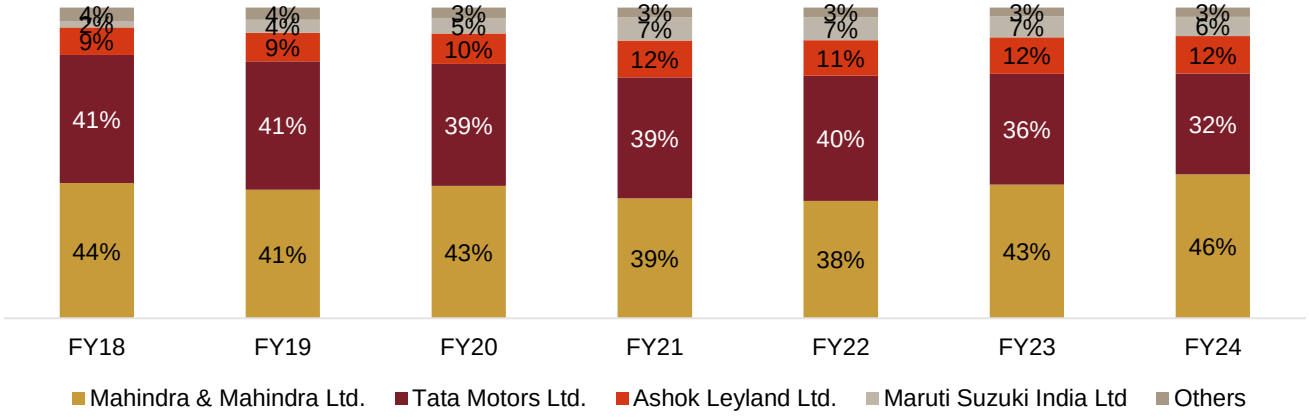


Note - Other players are Force Motors Ltd., Isuzu, JBM auto ltd, Maruti Suzuki Ltd, Olectra Greentech Limited, Piaggio Vehicles Pvt. Ltd., SML Isuzu Ltd., Swaraj Mazda Ltd., Toyota Kirloskar Motor Pvt Ltd., VEVCs – Volvo and Volvo Group India Pvt Ltd.

Source: SIAM, CRISIL MI&A

Mahindra lost some share during fiscal 2021 and fiscal 2022 amidst the supply constraints, semiconductor shortage faced by the company. However, in fiscal 2023, Mahindra regained some ground with some easement in supply as well as with the launch of new Bolero City Pik-Up, an addition to its existing Pik-Up range as well as Furio range boosting its share. Since the launch of Boss, Ashok Leyland has rapidly gained market share in the ICV segment. In FY24, there is some pressure seen in the sub-one category that is impacting Tata Motors' share, whose Tata Ace has been a dominant one in the same category. Also, Mahindra has been benefitted due to a potential trend shift happening from sub-one tonne to pik-up category where they have strong market hold.

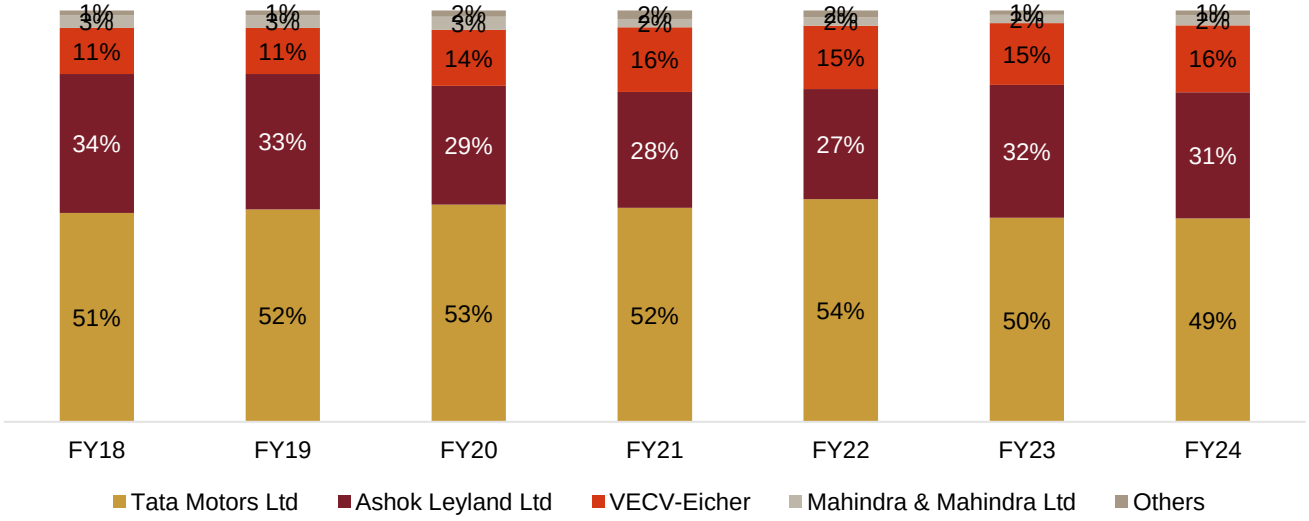
LCV Goods Segment split by market share across OEMs



Note: Others include VECVs Eicher, Swaraj Mazda Ltd, Tata Motors, Force Motors Ltd, Isuzu, Toyota Kirloskar Motor Pvt Ltd and Piaggio Vehicles Pvt Ltd

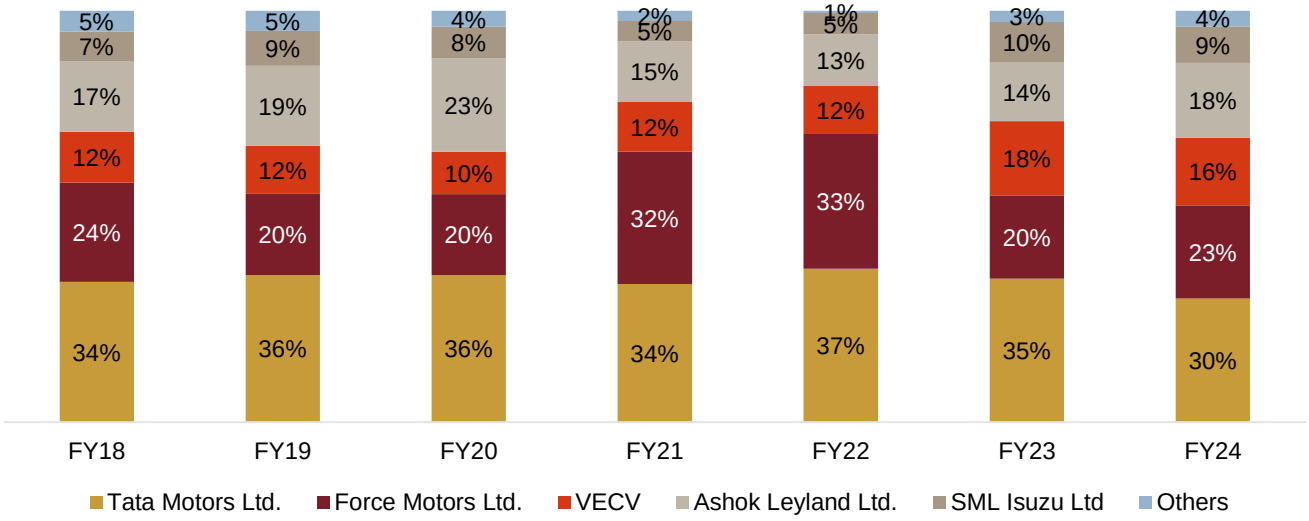
Source: SIAM, CRISIL MI&A

MHCV Goods segment split by market share across OEMs



Source: SIAM, CRISIL MI&A

Bus segment split by market share across OEMs



Source: SIAM, CRISIL MI&A

Emerging Trends in CV ecosystem

Alternate fuels

The adoption of alternate fuels in commercial vehicles has gained significant momentum in recent years, driven by the need for low emission transportation solutions to address environmental concerns, reduce dependency on fossil fuels and achieve zero emission transportation. Three prominent alternatives that have garnered attention are Electric Vehicles (EVs), natural gas, and hydrogen-powered vehicles.

EV adoption in the commercial vehicle segment is gradually picking up pace in the LCV and bus segment due to advancements in battery technology, declining battery costs, and favourable government policies. The government has been stepping up efforts in promoting electric mobility through FAME-II scheme. It has identified STU buses as a one of the key vehicle segments that should adopt electrification and availability of incentives are driving adoption of EV fleets by STU buses. These vehicles offer several advantages, including lower operating costs, reduced emissions, and quieter operation. However, challenges such as limited charging infrastructure and concerns over range and load capacity hamper the adoption of EVs in haulage and heavy vehicles segment.

Compressed Natural Gas (CNG) and Liquefied Natural Gas (LNG) are being considered as cleaner alternatives to traditional diesel and petrol in commercial vehicles. CNG is particularly popular for buses, LCVs and ICVs. It produces fewer emissions of pollutants like particulate matter and nitrogen oxides compared to conventional fuels. With increasing gas network coverage across different Indian states due to city gas distribution (CGD) bidding rounds 9, 10, 11 and 11A, reach of gas pipelines would not be a problem, resulting in a swifter shift from diesel to CNG. Also, in FY2023 an incremental ~1,134 new stations were added respectively, taking the total number of CNG stations to 5,665 in March 2023. With a clear increase in the number of stations, the number of CNG vehicles launched by OEMs would see an increase. The 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.

Hydrogen is also being explored as an alternate fuel for commercial vehicles through fuel cells and hydrogen ICE powertrains. Hydrogen-powered trucks and buses offer long ranges and faster refuelling times compared to EVs. They emit only water vapor as a by-product, making them attractive from an emissions standpoint. However, challenges such as the high cost of production, transportation, and infrastructure development hinder widespread adoption. Furthermore, MoRTH have framed draft rules for type approval of hydrogen ICE vehicles under M and N category and MNRE have introduced National Green Hydrogen mission to incentivize the commercial production of green hydrogen and make India a net exporter of the fuel. However, these initiatives are yet to see a fruitful outcome since this technology is still in its early stages.

Truck Aggregation

The truck aggregation trend has witnessed significant growth over the past few years. This model involves online platforms that connect truck owners and transporters with businesses requiring freight services. It has transformed the traditional trucking industry by enhancing efficiency, reducing empty miles, and providing better load utilization. Truck aggregation platforms like BlackBuck, Rivigo, and TruckSuvidha have gained prominence, streamlining logistics through digital solutions. These platforms offer benefits such as real-time tracking, transparent pricing, and improved fleet management. Government initiatives like GST implementation, Logistic Efficient Enhancement Program (LEEP) and improved road infrastructure have further bolstered the growth of truck aggregation.

Telematics and connectivity

Telematics involves the integration of telecommunications and informatics to enable real-time communication and data exchange between vehicles, fleet managers, and centralized systems. While connectivity enhances fleet management, and operational efficiency. Commercial vehicles are equipped with GPS, sensors, and communication devices, enabling fleet operators to monitor real time parameters like location, fuel consumption, speed, and driver behavior. This data-driven approach optimizes routes, reduces idle time, and enhances fuel efficiency, resulting in cost savings and reduced carbon emissions. Connectivity solutions also improve vehicle maintenance as real-time diagnostics allow predictive maintenance by minimizing breakdowns and downtime. Also, monitoring of driving behavior promotes responsible practices, minimizing rash driving and emergency alerts for assistance in case of accidents. Government regulations, such as AIS-140 norms mandating vehicle tracking systems, further catalyze the adoption of telematics. Established players like Tata, Ashok Leyland and startups in India offer customizable solutions, fostering healthy competition and technological advancements.

Commissioning of dedicated freight corridors (DFCs) to put brakes on road freight and hence CV sales

The DFCs are expected to help the Indian Railways regain its lost freight share, by reducing turnaround times between the importing and consuming destinations. Not only will the DFC induce faster freight movement, but it will also allow for faster evacuation of cargo from the ports, thereby improving efficiency. In fact, the DFCs and the associated logistics parks are likely to help industries significantly reduce their plant-level inventory as well, enabling savings in working capital. Moreover, the shifting of freight to rail will aid the economy by decongesting major highways.

Thus, the roads segment, which has outperformed rail over the past decade, will lose some share once the DFCs are commissioned.

Outlook of Indian commercial vehicle industry

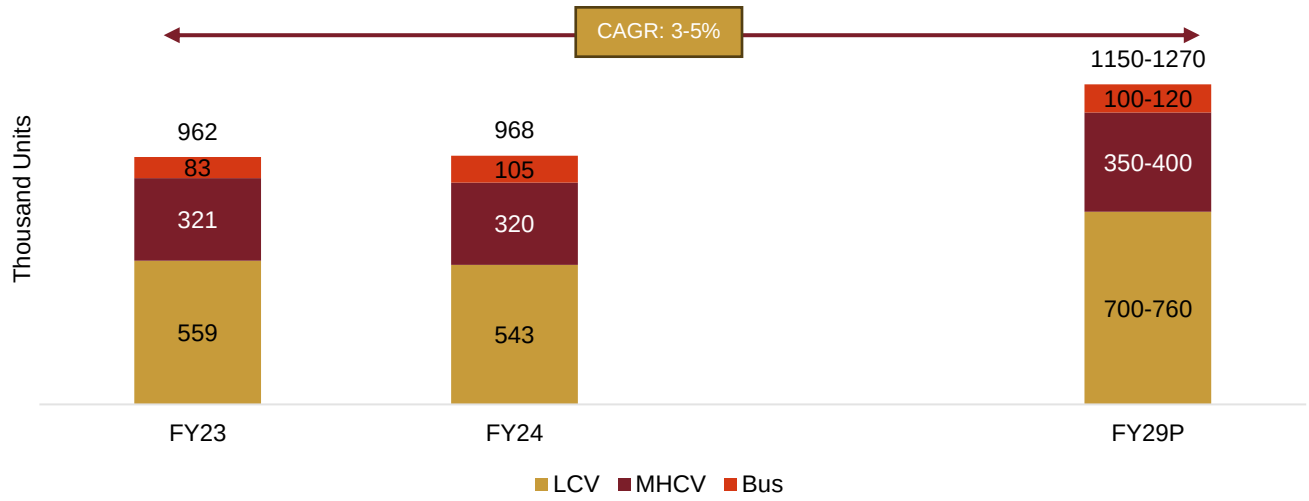
The CV industry recovered spectacularly in fiscal 2023, with a 34% growth rate and 0.6% in fiscal 2024, reaching 96% of pre-pandemic levels of fiscal 2019. Increased government spending, robust replacement demand, and strong end-user sectors such as construction and mining are expected to support growth.

Light commercial vehicle goods (LCV) sales declined by -3% in fiscal 2024, supported by sustained replacement demand with rising competition from electric three-wheelers, especially in the sub one tonne segment restricting further expansion. In fiscal 2023, LCV sales recorded impressive growth of 23%, rebounding to 99% of pre-pandemic levels. The surge in sales can be attributed to robust replacement demand, especially in the sub-one-tonne category, which was deferred due to economic challenges and the pandemic. However, LCV sales declined 9% in the first quarter of fiscal 2024 due to supply side constraints on account of OEMs transitioning to BS VI stage II emission standards. Despite this setback, the industry anticipates a revival in sales in the upcoming quarters, driven by a good monsoon season and an improved economic outlook with the easing of supply constraints.

Bus sales witnessed an increase of 26.8% in fiscal 2024, owing to strong replacement demand and urbanisation trends. CNG adoption has been hampered, affecting LCV sales. The CV industry, led by MHCVs, is expected to grow steadily over the next five years.

Over the long-term horizon, domestic CV sales are projected to record a 3-5% CAGR between fiscals 2024 and 2029, led by a 5-7% CAGR in the LCV segment, 2-4% CAGR in the M&HCV segment and 1-3% CAGR in the bus segment.

Commercial vehicle domestic sales outlook



P: Projected; E: Estimated,

Source: SIAM, CRISIL MI&A

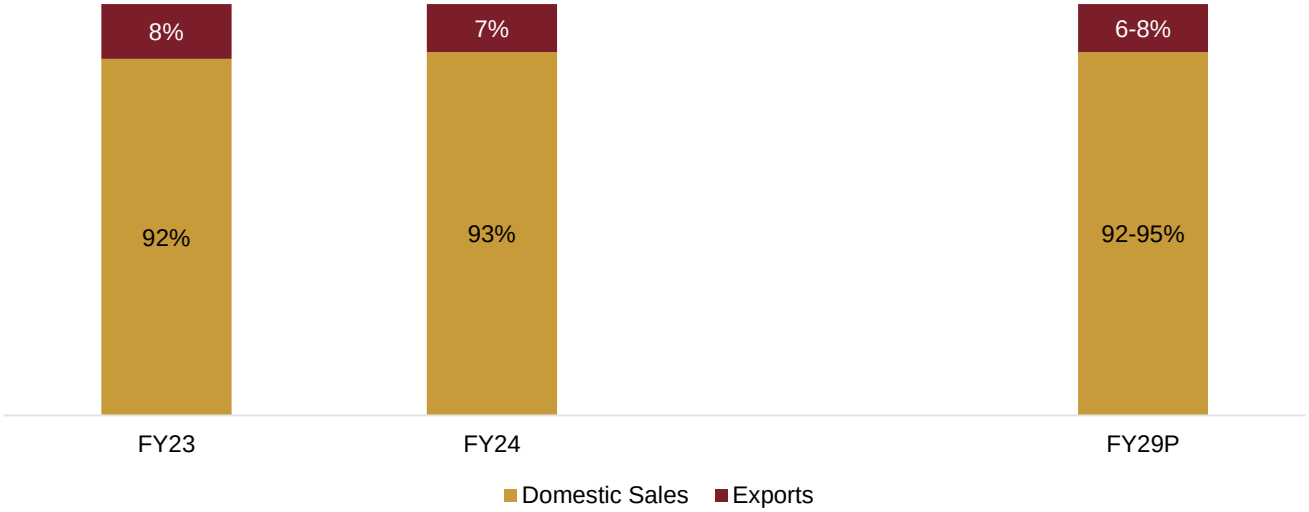
Split by domestic sales and exports

The Indian CV industry is expected to remain domestic-focused, with domestic sales comprising ~93% share of production even in fiscal 2029. However, with exports projected to grow at 5-7% CAGR between the fiscal periods 2024 to 2029, their contribution to overall production is likely to remain flat.

The second Covid wave resulting in lockdowns in key affected areas in the first quarter of fiscal 2022 impacted domestic sales across segments, posting a healthy fourth quarter in fiscal 2021. Consequently, LCV and MHCV volumes declined ~42% and ~63% sequentially (on-quarter) and overall CV volumes by ~50%. Also, with a significant share of loans under moratorium amid low fleet utilization and freight rates, risk-averse financiers limited wholesale offtake. In FY22, LCV and MHCV sales improved by ~17% and 50% and on-year respectively over a low base of FY21. As mobility restrictions were relaxed and economic activities started picking up after the second wave abated in Q1 FY22, CV sales have picked up. This resurgence can be attributed to pent-up replacement demand that had been hampered during the preceding 2-3 years due to economic stagnation and the disruptive impact of the pandemic.

On the exports front, manufacturers are directing their investments into expanding presence to other Asian countries from neighbouring countries such as Bangladesh, Nepal, and Sri Lanka to Africa and the Middle East. Domestic players are also considering setting up assembly operations across multiple markets. Also, going forward, new product line-ups and technology upgradation will allow domestic players to enter relatively advanced markets of south-east Asia. The economic slowdown is anticipated to lead to reduced consumer spending and investment in various regions, subsequently impacting merchandise trade volumes and posing significant challenges for India's export prospects.

CV industry split into domestic sales and exports



Note: P - Projected

Source: SIAM, CRISIL MI&A

CRISIL MI&A expects sales of commercial vehicles to grow at a CAGR of 3-5% between fiscals 2024 and 2029 aided by healthy industrial growth, focus on infrastructure and higher mining production. CV sales has plummeted ~29% in fiscal 2020 and further by ~21% in fiscal 2021. The fall in sales had created a low base over which volumes have witnessed growth of ~26% in fiscal 2022. In the last three years (FY2020-FY2023), the industry demonstrated a strong CAGR of 10%. The rise in tonnage addition is expected to be driven by an improved product mix, with a notable surge in demand for Multi-Axle Vehicles (MAV) and T-Trailer despite a shift to lower tonnage vehicles due to axle norm regulations.

End-use sector outlook (between fiscals 2024 and 2028P)

Key end-use segments and outlook		
Sectors	**Growth outlook (FY24-FY28)**	**Key aspects**
Coal	5-6%	Growth in coal-based power generation Demand from allied sectors such as cement and sponge iron
Steel	6-7%	Building and construction, the major demand creator in this segment Demand to be driven by rural housing / affordable housing and commercialization of Tier III/IV cities.
Cement	5-6%	Infrastructure demand also plays an important factor according to National Infrastructure Pipeline (NIP)
Port movement	2-5%	Iron ore exports to support growth, as global demand for steel improves. POL trade (imports) particularly in LPG poised to go up
Road investment	8-12%	NIP to drive infrastructure investments on roads and highways. CRISIL MI&A expects the Govt. of India (GoI) to be able to achieve 80-85% of its targeted investments

E-commerce	20-25%	Food, fashion and grocery segments grow at a faster rate as penetration improves. E-retailers to focus on expansion in Tier I/II cities over this period

Source: CRISIL MI&A

Medium and Heavy Commercial Vehicles Set to Thrive in the Coming Five Years

The MHCV industry is expected to grow significantly, with a compound annual growth rate (CAGR) of approximately 2-4% projected from fiscal year 2024 to fiscal year 2029.

Long-term MHCV sales are likely to be driven by several factors, including the country's improving industrial activity, consistent agricultural output, and the government's continued emphasis on infrastructure development. However, volume growth may be limited due to efficiencies gained from the implementation of the Goods and Services Tax (GST), the development of improved road infrastructure, and the commissioning of the dedicated goods corridor (DFC). Nonetheless, the industry remains on a promising growth trajectory in the coming years.

Over the next five years (fiscal 2024-2029), industry GVA is expected to be robust, driven by the government's emphasis on "Make in India." Furthermore, infrastructure improvements and higher-than-expected corporate spending are expected to support the capex cycle after fiscal 2024.

LCV sales to grow at a modest pace in the long run.

Light commercial vehicle (LCV) demand is expected to grow at a 5-7% CAGR from fiscal 2024 to fiscal 2029, owing to increased private consumption, lower penetration, increased availability of redistribution goods, and improved financing. The industry grew at a 4% CAGR between fiscal 2018 and 2024.

Upper-end light commercial vehicles (ULCVs) provide lower returns to the transporter than ICVs and are best suited for captive use. Entry restrictions on ICV trucks and higher tonnage MHCVs are expected to keep demand from this segment buoyant. However, the higher toll on ULCV trucks versus pickups will limit segment growth.

SCV segment now offers a diverse range of products in various tonnages that cater to the needs of all types of customers. To fill tonnage gaps, players have launched a slew of new products, particularly in the last five years. In addition, the availability of CNG options is expected to keep volumes in this segment stable.

Bus demand is to witness strong growth over the next five years.

Domestic bus sales are expected to grow at a CAGR of 1-3% between fiscal years 2024 and 2029. Increased demand for inter-city/state travel, aided by improved road infrastructure, and higher personal disposable incomes will drive growth. The unregulated segment, which primarily serves demand from schools, businesses, and intercity travel by private operators, will continue to be the largest end-user. However, the implementation of metro-rail and monorail in several cities would have an impact on future bus sales growth. In terms of penetration (buses per 1,000 people), India ranks last among the countries studied, with 1 bus per 1,000 people and a 35% urbanization rate. These calls may have an upside if the scrappage policy is enforced, as well as increased urbanization and replacement of JNURM buses purchased between FY10 and FY13.

Review and outlook of the electrification in commercial vehicles (fiscal 2018 to 2029)

Electrification in commercial vehicles

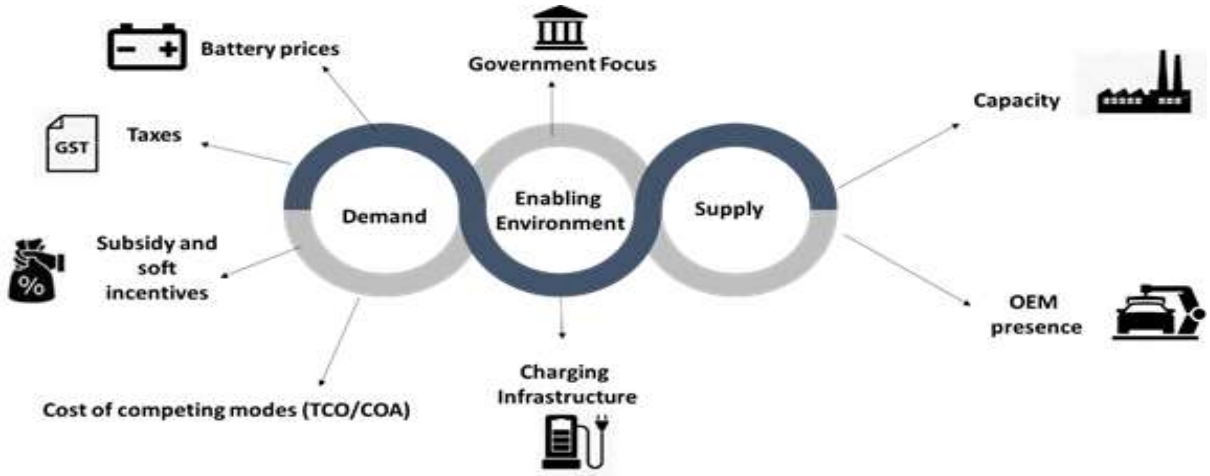
The Government of India has undertaken several steps to ensure proliferation of electric vehicles, such as Faster Adoption and Manufacturing of Hybrid and Electric Vehicles (FAME I and FAME II), Phased Manufacturing Program (PMP) and Production Linked Incentive (PLI) to name a few. The same has been supported by lucrative state EV policies, which a few progressive states have released.

Electric vehicles share of various vehicles segments such as two-wheelers, three wheelers, passenger vehicles and buses are still in single digits despite multiple measure by the Government to support electric vehicle sales. EV penetration is low currently due to many issues such as limited presence of mainstream OEMs, model availability in certain segments like motorcycles, lack of charging infrastructure, financing availability etc.

Currently, most EVs used in the commercial segment as goods carries are three-wheelers and LCVs are picking pace. However, as the cost differential between electric and diesel vehicles start reducing, CRISIL expects new models to be launched, which will drive sales in the segment as the third-mile logistics and local distribution of goods are well suited applications for electric vehicles.

Due to the Government support through FAME and focus on quicker adoption of EVs in public transport, there has been significant increase in electric bus sales in the last couple of years. Further, through the introduction of PM eBus Sewa scheme government aims to augment the city bus operations using 10,000 e-buses through Public-Private Partnership (PPP) model across India. The Scheme will support bus operations for 10 years and would have an estimated cost of Rs.57,613 crore, out of which support of Rs.20,000 crore will be provided by the Central government. Operational profile of buses with fixed routes and regular stops makes them suitable for charging at pre-determined intervals and specific locations.

EV demand drivers

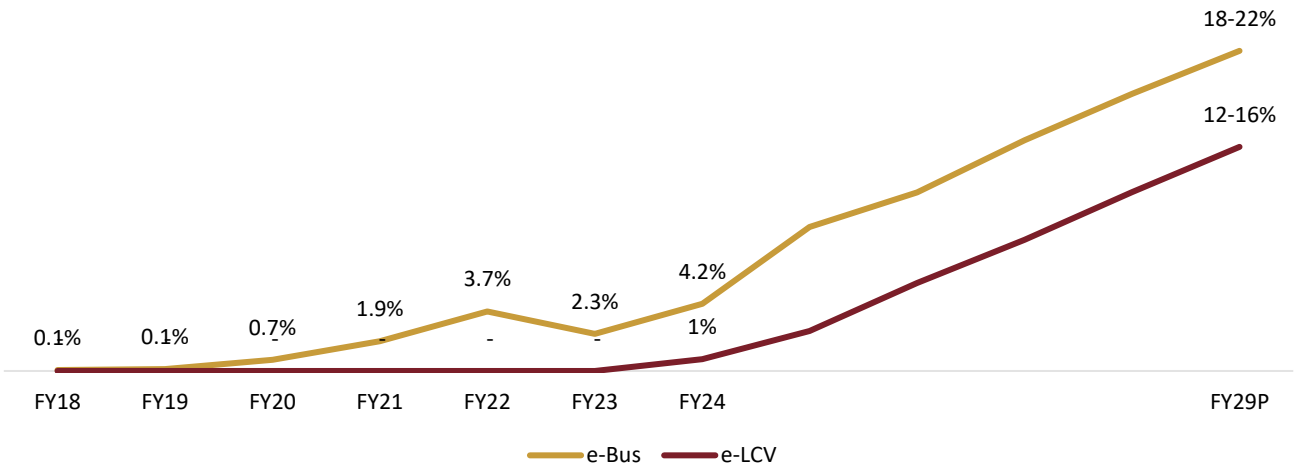


Source: CRISIL MI&A

- **Lesser environmental impact**: Compared to ICE vehicles, limited impact of EVs on the environment is the primary reason for increasing focus on electric vehicles globally. It is expected to drive the demand going ahead.
- **Government Focus**: Central as well as state government are focussing on promoting electric vehicles to the consumers. Governments are incentivising customers in the form of subsidies, tax breaks, waiver on registration certificates (RC) and renewal of RC for EVs etc. The Government incentives will remain the major driving force for the EV adoption. For commercial vehicle segment, government is also supporting EV usage through STUs by committing to convert a significant portion of the public transport infrastructure fully electric in the next few years.
- **Lower operating costs**: One of the primary advantages of an EV for the customer is its lower operating cost. The recent rise in fuel costs has provided an added impetus to the EV adoption. Although the cost of acquisition is still one of the major hurdles for EVs, lower operating cost is expected to remain a significant incentive for customers. The lower battery cost, reduced GST rate of 5% and FAME-II demand incentive are expected to improve the cost of ownership and hence viability of EVs.
- **Charging infrastructure**: Availability of charging infrastructure remains a key determinant in EV adoption. Government, power distribution companies, OEMs are focussing on expanding the supplementary infrastructure including the charging infrastructure which will surely aid the EV adoption in the longer run. For instance, The Ministry of Road Transport and Highways announced plans to set up EV charging kiosk at each of India's 69,000 petrol pumps across the country. State government of Andhra Pradesh has decided to set up ~400 EV charging stations along the National and State Highways. Delhi government has announced to set up charging stations within every 3 kms distance in the city. Besides, large corporate such as MG Motor and Tata Motors installed 60 kW Super-fast EV charging station in Mangalore.
- **Increased OEM presence**: Most of the mainstream players are planning to launch an electric vehicle offering which is expected to boost the sales in the longer horizon.
- **Capacity expansion:** Most OEMs are expanding EV capacity to address the expected rise in electric vehicles. Moreover, government push in the form of mandatory localisation, PLI schemes will also provide an additional support to the capacity expansion.
- **Competitive pricing**: Battery is the primary contributor to the high electric vehicle prices. Through R&D, manufacturers are trying to lower the battery pricing while increasing the vehicle range. Companies are trying to achieve a golden mean between pricing and the range. This improvement in the customer offering will provide an impetus to the EV demand.

Batteries account for ~40-50% of the total EV cost. Prices of batteries have been falling moderately. The fall is expected to continue over the next five years. India is highly dependent on imports of batteries due to lack of manufacturing facilities for battery cells (ACC). However, the Government announced initiatives for reducing battery prices further by localization of electric vehicle battery manufacturing. As part of the production-linked incentive scheme, the Union Cabinet earmarked ~Rs. 18,100 crores for setting up 50 giga watt hour (GWh) of advanced chemistry cell (ACC) manufacturing facility and 5 GWh of niche ACC capacity.

EV penetration in CVs (FY2018-FY2029P)



Note: FY21 and FY22 were COVID impacted years and hence the overall sales of buses were low which leads to low base effect in FY21 and FY22

Source: CRISIL MI&A, VAHAN

Electrification in passenger vehicles (buses)

EV bus registrations skyrocketed in the last 3 years backed by adoption by STU as well as government incentives. During fiscal 2019-2023 period, EV bus registration increased at a breakneck pace of 133% CAGR with more than 600% on year growth clocked in fiscal 2020. EV penetration was insignificant till fiscal 2019, it gained some pace during fiscal 2020 and received a real boost during fiscal 2022 to reach more than 1,100 units and reached 3.7% of overall registrations. Growth momentum continued in fiscal 2023 with y-o-y growth of 61% reaching more than 1,900 units.

Due to the government support through FAME and focus on quicker adoption of EVs in public transport, there has been a significant increase in electric bus sales in the last couple of years. Operational profiles of buses with fixed routes and regular stops make them suitable for charging at pre-determined intervals and specific locations. However, sales of electric buses are unlikely to meet the target in fiscal 2021 due to the pandemic and hence we expect the subsidy amount to get carried over to the coming years.

The price of an electric bus is electric bus is considerably higher than the cost of a bus running on diesel. Thus, subsidy would be a key driving factor that would drive EV adoption in STU buses. We expect a large part of the STU intra city buses to be electric by fiscal 2028. However other segments are unlikely to see a meaningful penetration of electric buses owing to their high cost of acquisition and limited range limiting their ability for intercity travel.

CRISIL expects FAME subsidies to be extended for buses as the policy period ends in fiscal 2024. With other incentives from the central and state governments, the sales of electric bus penetration is expected to reach 18%-22% by fiscal 2029.

Electrification in LCV goods vehicles

Currently, most of the EVs used in the commercial segment as goods carries are three-wheelers. However, as the cost differential between electric and diesel vehicles start reducing, we expect new models to be launched. This will

drive sales in the segment as the third-mile logistics and local distribution of goods are well suited applications for EVs. Tata Ace EV is the only e-SCV currently in the market.

Consequently, as depicted in the chart above, EV sales in the LCV goods segment can rise to 81,000-82,000 vehicles by fiscal 2028. This would be about 12-13% of the total LCV goods vehicle market, as CNG offers better TCO in near future and will be preferred over electric variants. Further EV penetration is expected to grow and reach 12-16% by fiscal 2029.

Electrification in HCV goods vehicles

EV adoption in the HCV segment is expected to be negligible in the near future as operational profile makes them highly expensive. Further, the current charging infrastructure is not suitable for larger HCV batteries, which will make electric adoption unviable for some time.

Policies driving the adoption of EVs.

The Government of India and several state governments together has introduced a set of fiscal and non-fiscal incentives to support the adoption of electric mobility. These incentives include tax breaks, subsidies, and lower registration chargers through multiple policies to promote demand. To strengthen the manufacturing ecosystem, various policies have been launched to strengthen the component and charging infrastructure.

Government subsidies to drive Electric Vehicle (EV) adoption by STU buses

The Government has been stepping up efforts in promoting electric mass mobility through FAME-II scheme. It has identified STU buses as one of the key vehicle segments that should adopt electrification. Further policies like PM eBus Sewa schemes aims to further incentivize the electrification of public transport.

FAME I and FAME II

As part of the National Electric Mobility Mission Plan (NEMMP) 2020, the Department of Heavy Industry (DHI) introduced the FAME scheme in 2015. The FAME scheme aims to promote the manufacturing of electric vehicle technology and ensure the sustainable growth of the ecosystem.

During Phase-I, it focused on creating demand for electric vehicles through incentives and grants for various vehicle segments, resulting in about 2.78 lakh supported EVs via demand incentives. FAME II scheme, approved with an outlay of INR 10,000 Crore, aims 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 2W EV (including commercial and private).

FAME-II subsidy for buses and LCV dependent on battery size

Under the FAME-II incentive, the Government will provide subsidy amounting to Rs. 20,000 per kWh of battery used in an electric bus. The batteries used in such buses needs to be ‘advanced batteries’ with specific energy density of at least 70Wh/kg and cycle life of at least 1000 cycles. The total demand subsidy under FAME-II scheme is Rs. ~9000 crore, a portion of which would go to buses.

For electric SCVs, government will provide subsidy amounting to Rs. 10,000 per kWh of battery used in a commercial vehicle. It also mandates a minimum range of ~140 km and maximum ex-factory price of ~Rs. 15 lakhs.

FAME-II demand incentive only via OPEX model

A demand incentive would be provided for buses only sold under the Public Private Partnership in Operation and Maintenance of Electric Buses (OPEX) model. In the OPEX model, the OEM takes the risk of operating the electric

bus and gets a pre-decided revenue per km running of the bus. The benefit of this model is that there is no upfront cost to the STU as the bus is owned by the OEM or generally an OEM backed transport firm. This also reduces the risk of technology obsolescence for the STU.

Many state governments are providing incentives to purchase an electric vehicle where the benefit provided is in addition to FAME-2 policy benefits.

- Maharashtra's EV policy aims to achieve at least BEVs to contribute to 10% of new vehicle registrations by 2025, 10% electric 2-wheelers by 2025, 20% electric 3-wheelers by 2025, 5% electric 4-wheelers by 2025, 15% electric buses by 2025, 25% electric fleet operators by 2025. Maharashtra provides strong demand incentives of INR 5,000/kWh up to INR 1,50,000 for the first 10,000 electric 4-wheelers cars, INR 5,000/kWh up to INR 1,00,000 for the first 10,000 electric 4-wheelers goods carrier and 10% of the ex-factory cost up to INR 20,00,000 for the first 1000 e-buses.
- Gujarat has announced an EV policy that would provide purchase incentives of Rs. 10,000/kwh subject to a maximum of up to Rs 6 lakh/vehicle for the first 20,000 electric four wheelers. The policy will remain valid till 2025.
- Odisha has announced a subsidy of 10% up to INR 20 lakhs for e-buses and incentive of Rs. 30,000 for the first 5000 electric goods carriers.
- Delhi has announced an EV policy that would provide purchase incentives of purchase incentive of Rs. 30,000 for the first 10,000 e-carriers and interest subvention of 5% on loans and/or hire purchase scheme for the purchase.
- Manipur is providing an incentive of Rs. 4,000/kwh for the first 30 electric buses. The policy also provides 100% exemption on road tax till 2026.

TCO assessment

A comparison of TCO of various CV types will provide a view as to how much a vehicle costs to own and operate over a period. Commercial operation of any vehicle will be viable only if the cost of operating it is below the revenue earned. A vehicle with a significantly higher cost of operation will not be viable due to competition from other vehicle categories and varying powertrains.

TCO between fiscals 2024 and 2029P for sub-segments LCV and Bus:

LCV (Sub 1 ton category)

CNG is the cheapest alternative powertrain, in the current scenario, due to the excessively high initial cost of electric LCVs. In the case of LCVs (at Delhi prices), the operating cost of an EV is 5% higher than that of a comparable diesel vehicle.

However, the operating cost of an EV is 14% higher than that of a comparable CNG vehicle, due to which the break-even period of an EV compared with a CNG vehicle is relatively higher.

As regards the cost of ownership, while EVs may be able to match the cost of diesel LCVs by fiscal 2032, they will still be considerably costlier than CNG LCVs.

TCO analysis for LCV – without subsidy

FY24				FY29			
TCO period (years)	**4 years**	**6 years**	**8 years**	**TCO period (years)**	**4 years**	**6 years**	**8 years**
Diesel	23.1	22.5	22.1	**Diesel**	28.3	27.5	27.1
CNG	21.2	20.5	20.1	**CNG**	26.4	25.6	25.1
Electric	24.2	23.0	22.3	**Electric**	27.9	26.7	26.0

Note: Numbers denote TCO in Rs per km, TCO period units in years, this is for Tata ACE vehicle without subsidy

Bus

The cost of ownership of an electric bus is in the range of a standard diesel bus over the long term. Commercial operation of any vehicle will be viable only if the cost of operating it is below the revenue earned. A vehicle with a significantly higher cost of operation will not be viable due to competition from other vehicle categories and varying powertrains.

The cost of ownership of an electric bus is like that of a standard diesel bus. In the bus segment, owing to the excessively high battery cost, there is a 4-5x difference in the initial purchase cost of a diesel/CNG bus and an electric bus. Because of this large differential, the gap in the break-even period between electric and diesel powertrains is more than 20 years despite a 30-35% lower operating cost for EVs. Hence, we believe capital subsidy would be needed to make electric buses viable by fiscal 2029, which, in turn, may limit their penetration to the public transport (STU) segment.

TCO analysis for MCV buses – without subsidy

FY24				FY29			
TCO period (years)	**8 years**	**10 years**	**12 years**	**TCO period (years)**	**8 years**	**10 years**	**12 years**
Diesel	43.0	41.9	41.0	**Diesel**	47.4	46.0	45.0
CNG	36.2	34.9	34.0	**CNG**	40.7	39.2	38.0
Electric	48.6	46.2	44.3	**Electric**	46.3	44.0	42.3

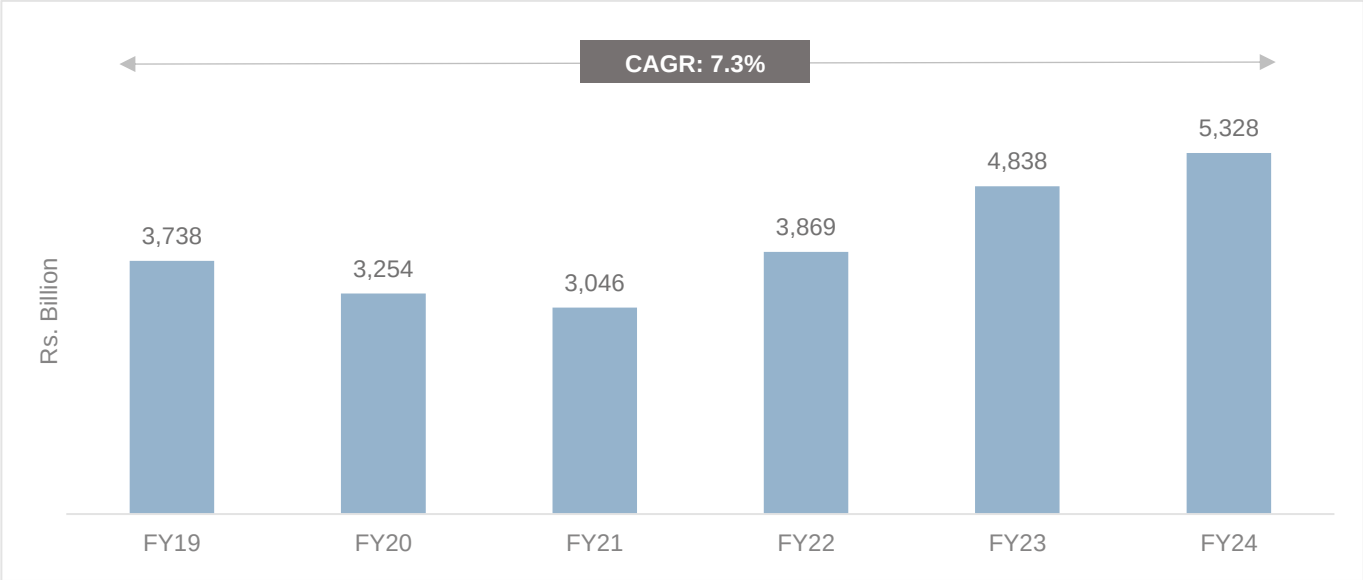
Note: Numbers denote TCO in Rs per km, TCO period units in years, For 12m bus without subsidy

10. Review and outlook of Indian automotive and non-motive components industry

Review of Indian auto components industry (fiscal 2019 to 2024)

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.

Domestic production of auto components (FY19-24)



Source: CRISIL MI&A

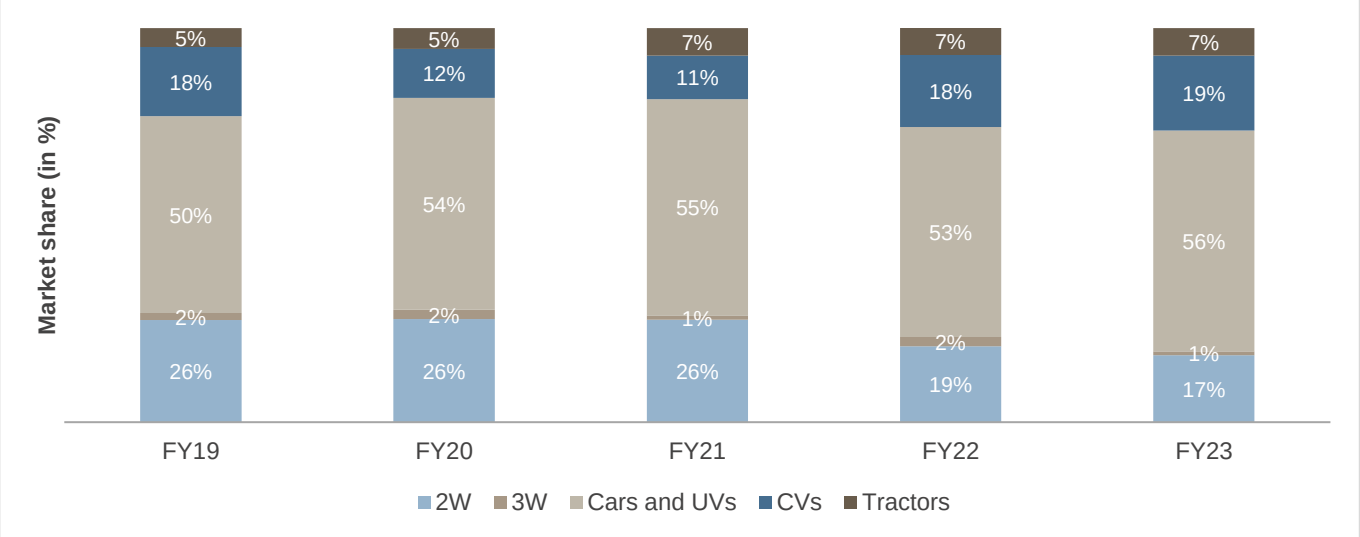
Auto component production revenue increased at 7.3% CAGR between fiscal 2019-2024 was aided by recovery in economy, buoyant demand from OEM and replacement market as well as increase in exports. CRISIL estimates domestic auto-component production revenue to increase by 8-10% in fiscal 2025.

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.

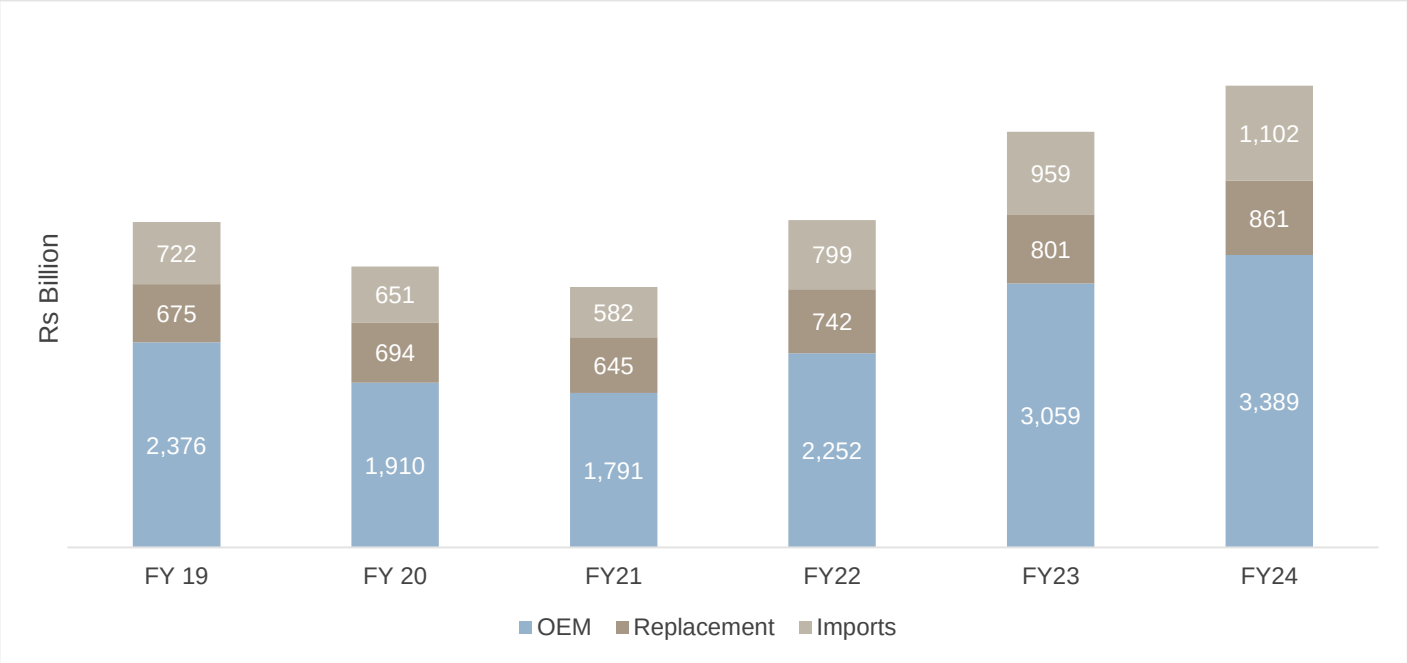
The domestic auto components industry largely consists of small and medium enterprises. The industry is composed of 780+ organized players and 5,800 unorganized players. In terms of revenue, however, the organized segment dominates the industry. Auto Component Manufacturers Association (ACMA) members 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.

Review of Auto component production segment by vehicle category



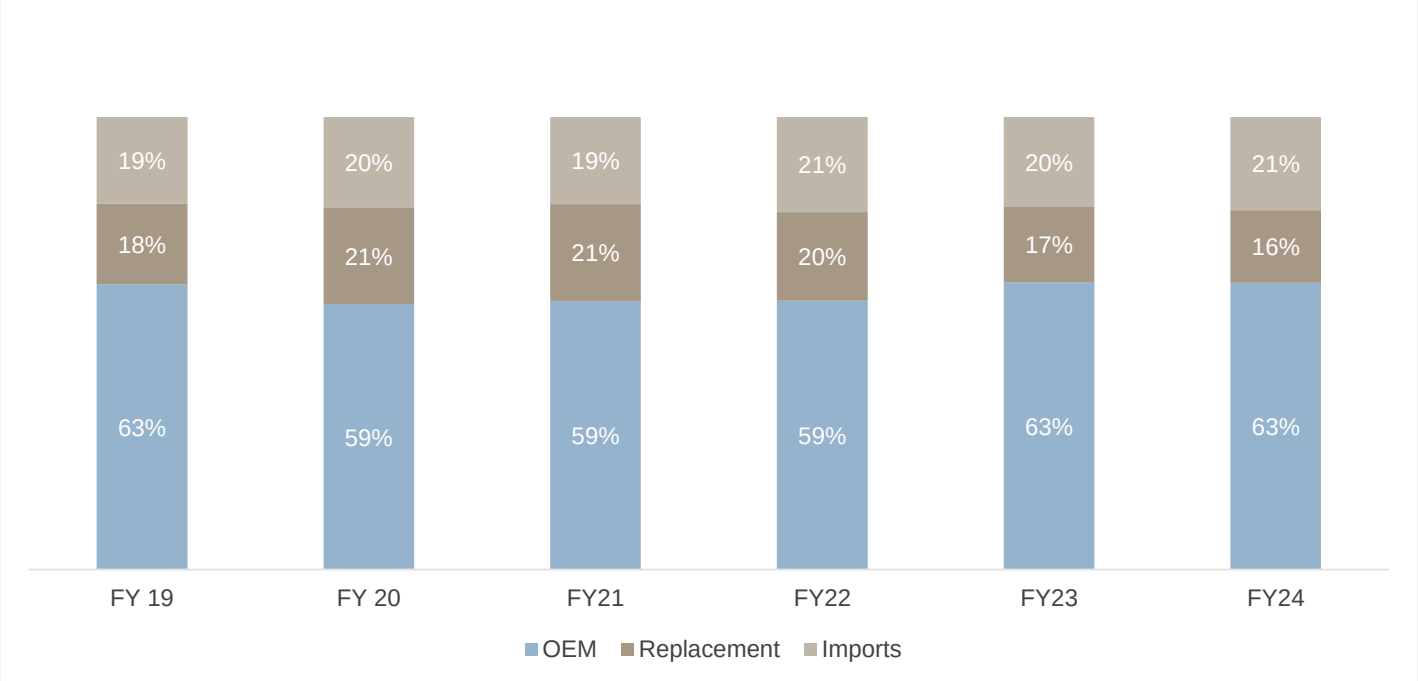
Source: SIAM, CRISIL MI&A

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



Source: CRISIL MI&A

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 (fiscal 2019 to 2024)

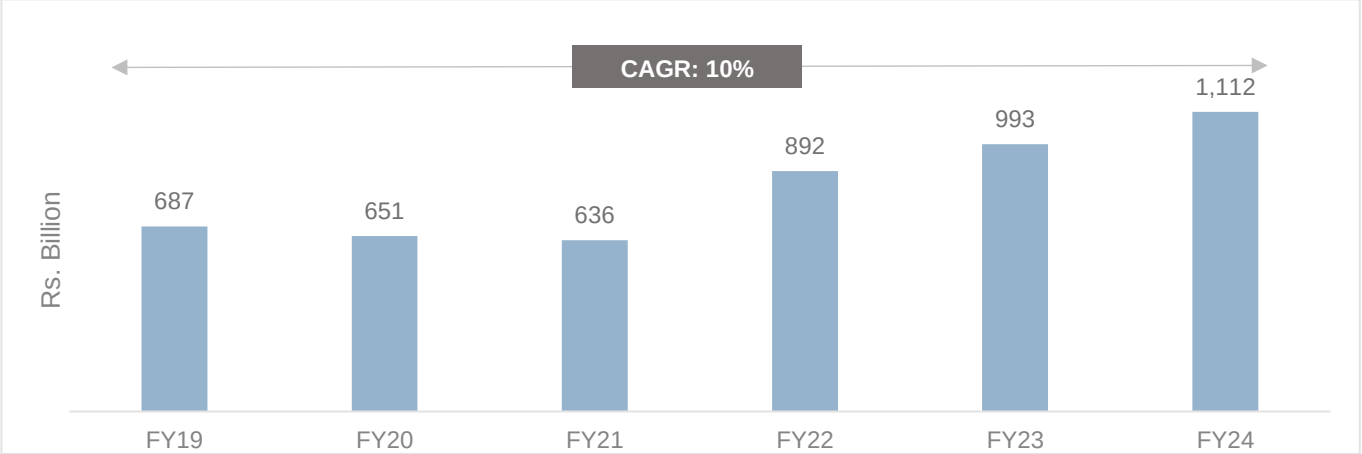
Auto component exports witnessed a strong growth at 10% CAGR during fiscal 2019-2024 period. Even during fiscal 2017-2020 period, exports witnessed a healthy growth at 11% CAGR. Fiscal 2021 witnessed a contraction amidst the pandemic and the restrictions.

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.

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 United States (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.

Review of exports of auto components (FY19-24)



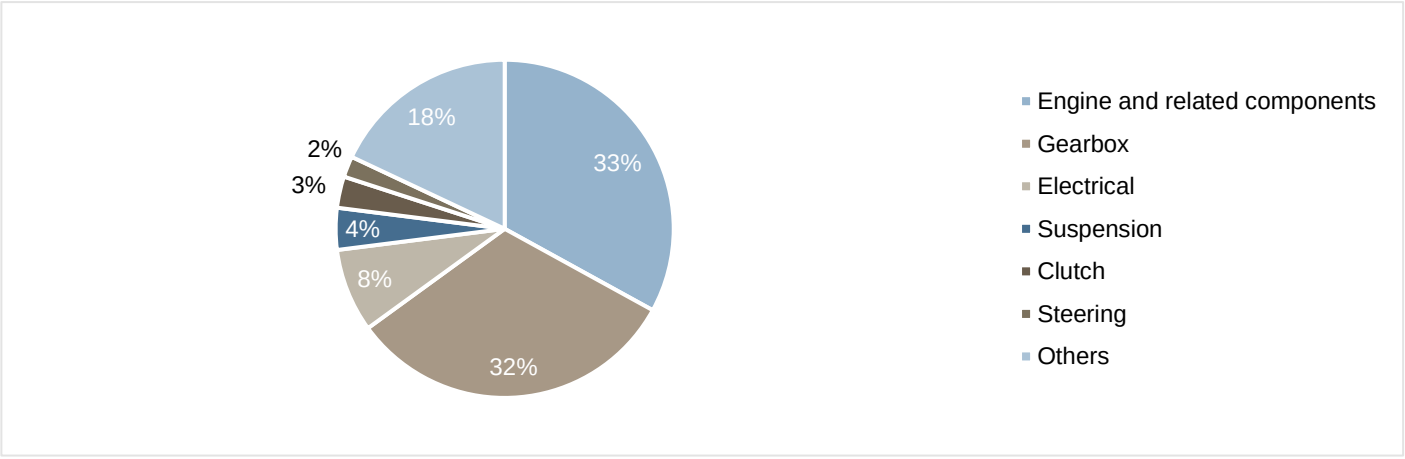
Source: CRISIL MI&A

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.

Segment wise production break-up (FY24)



Source: Automotive Component Manufacturers Association (ACMA), 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 premiumisation 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 CY 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 2W EV 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. 2W EV 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.

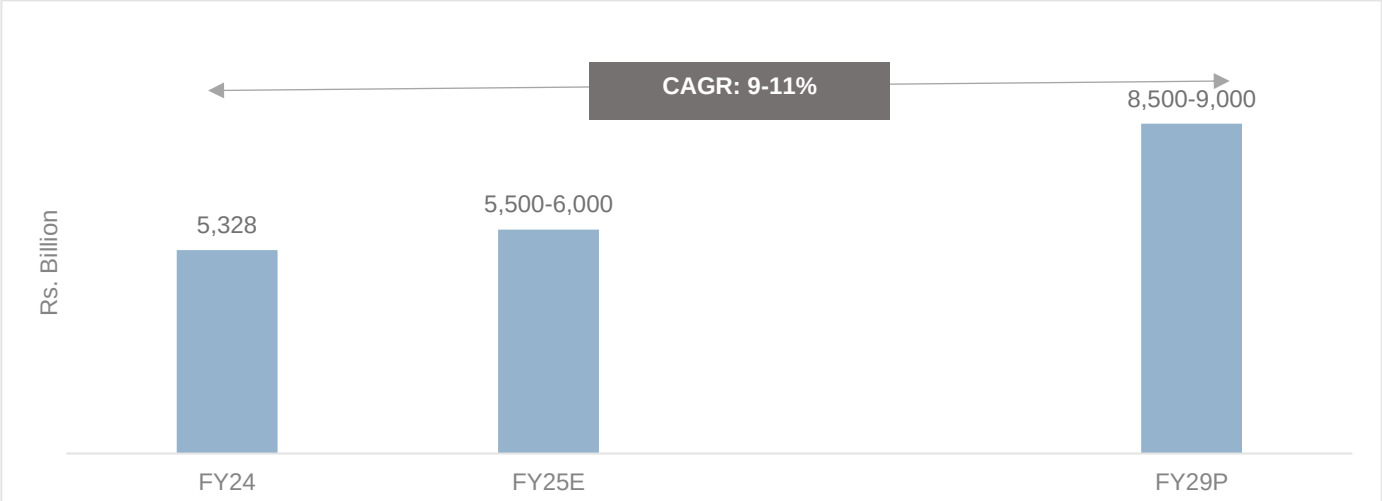
Indian manufacturers have been able to gradually increase their proportion of exports of critical components as they faced relatively less competition from other low cost producing countries in this segment. Many of these countries supplied more basic components, which were not as cost and quality intensive. 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.

Outlook of Indian auto components industry (fiscal 2024 to 2029)

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.

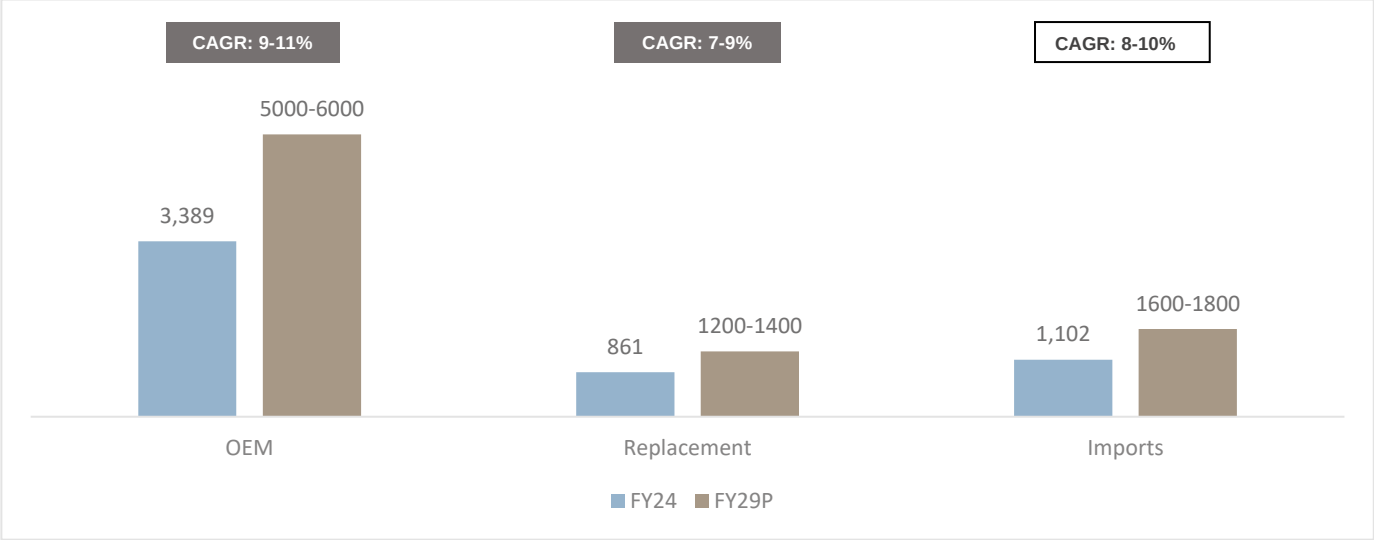
Outlook on domestic production of auto components (FY24-29P)



E: Estimated, P: Projected

Source: CRISIL MI&A

Outlook on domestic consumption of auto components (FY24-FY29)



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 and 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.

11. Market sizing and outlook of specific auto components

Overview of the auto component market

The company primarily deals into a specific automotive and non-automtive component segment, which is metal products, catering across vehicle categories from 2-wheeler, 3-wheeler, 4-wheeler, [earthmoving and material handling][to commercial vehicles. The [metal fabrication and metal finishing and assembly segment]is further classified into four manufacturing categories - chassis and structural, body parts, load bearing parts and fabricated components, using varied manufacturing processes including sheet metal, tubular, fabrication, assemblies etc.

Manufacturing category vehicle wise market size scope table

Manufacturing category	2W	3W	4W	Earth Moving and Material Handling	Commercial Vehicles
Chassis and Structural	Complete Frame/ Welded Chassis	- Lateral Members		- Booms - Arms - Buckets - Chassis and Frames (Stationary and Revolving) - Engine Frames - Links - Towers - Track Frames - Fuel and Hydraulic Tanks	- Oil Pans - Spare Wheel Carrier Assembly - Engine Cradle - Counterweights - Hydraulic Tanks - Accelerator Assembly - Brake Pedal Assembly - Crash Guards
Body parts	- Handlebar and Assembly - Main Stand and Assembly - Side Stands and Assembly - Footrests and Assembly - Pillion Handles - Carrier Assembly - Saree Guards - Engine Guards - Chain Cases - Battery Trays and Holders - Swing Arm and Assembly - Exhaust System (Mufflers and Silencers) - Wheel Rims (Roll Formed)	- Complete Driver Cabin Assembly - Windshields (Without Glass) - Doors - Floorboard - Splash Guards		- Complete and Assembled Driver Cabins (Backhoe Loaders, Excavators, Mining Equipment etc.) - Canopies - ROPS Assembly - Engine Hoods - Dust Reservoir - Doors and Handles	- Stamped Body Parts and Assemblies
Load Bearing Parts			- Shock Absorber Links - Torsion Link Rods - Control Arms		

Manufacturing category	2W	3W	4W	Earth Moving and Material Handling	Commercial Vehicles
Other fabricated components	-Various Complex Bracketry Items	-Various Complex Bracketry Items	- Fabricated Structure (Back and Base) - Tubular Head Rest Rods (Safety Critical) - Various Complex Bracketry Items	Operator Platforms and Baskets, Various Complex Bracketry Items	-Various Complex Bracketry Items

Source: CRISIL MI&A Consulting

Key trends, growth drivers and entry barriers in the industry

Electrification

To curb pollution levels, EVs are gaining global interest. In India as well, EVs are gaining popularity as the government is extending support via various policies to encourage EV adoption. Furthermore, growing awareness and concern for environmental issues is likely to driver electrification in India. The government support, coupled with rising awareness about EVs, environmental concerns, as well as the expansion in EV infrastructure 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, elevated fuel costs as well as an improvement in infrastructure support.

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 2W EVand three-wheeler (e-3W). The scheme is aimed at providing incentives for the purchase of 2W EVs and e-3Ws in the country. The scheme would support the adoption of 372,215 EVs in total, including 333,387 2W EVs 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.

2W EVs 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.

In the two-wheeler segment, initially lead-acid battery-powered scooters were launched in India which had average speeds below 25 km per hour (kmph). With innovations on the battery side, lithium-ion battery scooters gained traction, as they had average speeds of 40-50 kmph. Moreover, backed by a bevy of vehicle launches, entry of non-traditional players such as Ola and Ather into the EV space, added FAME subsidy incentives, increased ICE vehicle prices, and a sharp rise in fuel prices, EV sales have skyrocketed, especially in the last two years. The tech-savvy younger customer base quickly adopted these latest vehicles, which offered state-of-the-art features, attractive designs, lightweight body, and increased manoeuvrability.

Since EVs are simpler to produce than traditional ICE vehicles, many new OEMs have emerged in the space, both start-ups (such as Ather Energy, Simple Energy, and Tork Motors that have developed EV offering indigenously) and established business houses (such as JSW Group foraying into EV manufacturing). Non-legacy players such as Ola Electric, Ather Energy, Okinawa Scooters, and Ampere EV by Greaves have gained a strong foothold in the domestic 2W EV industry, stealing a march on established OEMs, and are disrupting the market with a hope to

leverage their first-mover advantage and technological expertise. Traditional ICE players have taken longer to enter the 2W EV segment; however, they are making up for lost time by rapidly expanding their sales network and production capacity and are likely to challenge the top EV players.

E-3Ws use lithium-ion batteries and have a speed of more than 25 kmph. They are used for cargo and passenger movement. This space is characterised by the presence of relatively few players such as Piaggio and Mahindra and Mahindra. Under FAME-I, lead-acid battery-driven e-3Ws were also eligible for the subsidy. However, under FAME-II, only advanced batteries and registered vehicles are eligible. Piaggio and Mahindra and Mahindra currently dominate the e-3W/e-autos retail market, accounting for more than 60% of retail sales. Market leader in the ICE segment, Bajaj has recently entered the e-autos space. Unlike the fragmented e-rickshaw segment, which is dominated by the unorganised market, the e-autos segment is much more organised and dominated by large traditional players. Three-wheelers are anticipated to spearhead the Indian EV journey because these vehicles are often used for short-distance trips, carry more load, and generally make do with a day's worth of charge. In addition to the cost advantage due to central and state subsidies on EVs, the total cost of ownership of an e-3W is much less than that of an ICE alternative.

EV penetration in the passenger vehicle (PV) segment was insignificant till fiscal 2021 but it received a significant boost amid a sharp rise in fuel prices, a rise in ICE vehicle prices and the launch of newer models in the EV segment. Additionally, rising awareness, shifting consumer preferences provided an added boost to EV demand. However, electrification in the passenger vehicle segment is still at a quite nascent stage amid range anxiety, limited charging infrastructure availability, and relatively high costs of EVs, raising the total cost of ownership of EVs. EV adoption will be spearheaded by the taxi/commercial passenger vehicle segment. For this segment, the continued lower cost of ownership will provide the incentive to shift from ICE vehicles to EVs. Moreover, the entry of Greentech EV-only start-ups such as BluSmart and CAB-E will further boost demand. EV adoption in the personal segment is expected to be gradual. EV penetration will also be propelled by policies adopted by the government for penalising non-adherence to CAFE norms.

Light weighting

Lightweighting is a crucial aspect for the transport sector in improving vehicle performance, energy efficiency and emissions, and making safer vehicles. Replacing cast iron and traditional steel components with lightweight materials can directly reduce the weight of a vehicle's body and chassis and therefore reduce a vehicle's fuel consumption increasing efficiency. Aluminium and high strength steel (HSS) are the most used metals by automakers for lightweighting while improving performance standards, safety, and corrosion. Apart form that the materials including composite materials which are made of carbon fibre, plastics and polymers are also used in vehicles to reduce weight.

Lightweight materials are especially important for hybrid, plug-in hybrid, and pure electric vehicles. Using lightweight materials in these vehicles can offset the weight of power systems such as batteries, electric motors and other drivetrain related components. With EVs penetration increasing, application of lightweight materials in automobiles is expected to grow as the use of these materials would improve the performance of EVs, due to lighter weight the efficiency of the vehicle can increase translating to higher range for a given size of battery, lowering the range anxiety expressed by customers. With high focus on energy efficiency and range anxiety in BEVs, light weighting is gaining increasing focus of automakers globally. Even in ICE vehicles, the need to lower greenhouse gas emission has seen adoption of materials such as aluminium, magnesium, composite materials which are used to make thinner body panels and other structural members which can improve fuel efficiency.

Lightweighting has always been a point of focus for both ICE vehicle and EV manufacturers. Companies are using components made from aluminium, HSS, composites and plastics by improving the properties of these components to match application needs while keeping the weight low. With the dual focus on reducing oil imports, as well as

gradually tightening fuel consumption, norms have forced OEMs to look for ways to improve fuel efficiency in their vehicles. One of these involves the use of components that have a higher strength-to-weight ratio, i.e., these components weigh less, but at the same time, offer superior structural properties and service life. Another area of focus is EVs, where efforts to alleviate range anxiety require more efficient vehicles that are lighter, but also strong enough to support heavier parts such as batteries, so that structural integrity is maintained on rough roads and in the case of a crash.

However, the adoption of aluminium frames/light weighting is still limited owing to the price dynamics, where in aluminium is priced 4x as compared to steel, which plays an important role in overall pricing of the vehicle.

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Entry Barriers

- The metal fabrication, metal finishing and assembly industry requires specialised machinery and robust engineering processes. There is close coordination between manufacturers and OEMs from the ideation stage for new products. As a result, OEMs typically have an extensive and detailed vendor approval process and generally require longer periods to onboard new supplier thereby making it difficult for new suppliers to enter.
- High Capital Investment: Laser cutters, bending machines, welding robots, and finishing equipment are expensive. This makes it difficult for startups to acquire the necessary technology. This can be a significant barrier for startups and smaller companies.
- Building a Customer Base and long-term relationship: The automobile clients are generally sticky to their component manufacturers as once the vendor is onboarded, they maintain a long-term relationship as the entire process includes multiple steps of testing, product fit which is extensive, expensive and time consuming.
- Supply Chain Management: Establishing reliable supply chains for raw materials, components, and tooling can be challenging, especially for new entrants.
- Developing strong partnership: Establishing reliable supply chains for raw materials, components, and tooling can be challenging, especially for new entrants.
- Technical Expertise: Skilled labor with expertise in sheet metal fabrication, tubular fabrication, metal finishing, and assembly is crucial for successful operations. Attracting and retaining such talent can be challenging.
- Technological Advancements: The industry is rapidly adopting advanced technologies, such as laser cutting, automated welding, and robotics. Keeping up with these advancements requires continuous investment and training.
- Regulations and Compliance: Strict environmental and safety regulations, as well as compliance with industry standards, can add complexity and cost to operations.

Domestic auto component market sizing

[Metal products]

Metal products play a critical role in the design, functionality, and overall performance of vehicles. The automotive industry relies on a variety of metals depending on their unique properties, strength, durability, and flexibility. These metallic components contribute to the structural support, functionality, and aesthetics of vehicles. Metallic parts form part of structural components, engine components, transmission and drivetrain, suspension components, wheels, and brakes. Thus, metals are used from the chassis that forms the vehicle's skeletal foundation to the exhaust system's silencer and plays a pivotal role in the automotive ecosystem. Metal components are backbone of automobiles that offers structural integrity, performance, and safety to various vehicles.

In summary, metal products in automobiles serve a variety of functions, from offering structural support to ensuring safety and enhancing overall performance. The choice of metals depends on various factors, including strength requirements, weight considerations, and cost-effectiveness. As technology advances, the automotive industry continues to explore innovative materials and manufacturing processes to improve the efficiency and sustainability of metallic components in vehicles.

Chassis and structural

Chassis/frames: Chassis/frame is a structural framework upon which entire vehicle is built and provides the fundamental support for other components and systems. These components are critical to the overall performance, safety, and durability of the vehicle. The chassis supports various components, including the engine, suspension system, and body. It provides a platform for mounting all the other parts and contributes significantly to the vehicle's overall strength and rigidity. The frame is the skeleton of the chassis, providing the basic structure to which other components are attached. It determines the vehicle's overall shape and supports the weight of the vehicle and its occupants. Traditional chassis and frames are made of steel due to its strength and cost-effectiveness. High-strength steel alloys are commonly used to achieve the necessary structural integrity while minimizing weight. Modern vehicles, especially electric vehicles are increasingly incorporating aluminium components in their chassis and frames to reduce weight and improve fuel efficiency. Aluminium offers a good strength-to-weight ratio and corrosion resistance.

Source: CRISIL MI&AHave changed the source to CRISIL MI&A

Lateral Members

Lateral members on a three-wheeler are components that run along the sides of the vehicle providing structural support and rigidity the hell distribute forces throughout the chassis especially during turns and uneven terrain.

The specific design and type of lateral members can vary depending on the three-wheeler type. Two common configurations

1. Frame paste chassis: A traditional ladder frame chassis uses longitudinal connected by lateral members that tie everything together and provide support against lateral forces. These can be tubes, beams or other shaped elements made from steel or other high strength materials

2. Monocoque chassis: Some three-wheeler particularly modern enclosed models might utilize a monocoque chassis this is a single shell structure where the body panels themselves become part of the load bearing structure in this case the lateral support can be integrated directly into the body panels with additional reinforcing elements to depending on the design.

Overall, the lateral members play a crucial role in maintaining the three-wheelers structural integrity and handling.

Arms

Within the intricate machinery of earth-moving equipment, the arm serves as a vital extension, amplifying the machine's reach and enabling the manipulation of diverse attachments. This robust structure, meticulously crafted from high-strength steel, operates through a system of hydraulics, mimicking the functionality of a giant, articulated limb. The arm assembly typically comprises several key components:

- Boom: The foundational element, the boom serves as the anchor point, firmly connecting the arm to the equipment's main body. It provides a stable base upon which the entire arm assembly pivots and extends.

- Stick: Interconnected with the boom, the stick facilitates the crucial extension and retraction of the working end of the arm. This manoeuvrability allows for adjustments in both reach and digging depth, maximizing the operational versatility of the equipment.

- Bucket Cylinder: Mounted strategically on the stick, this hydraulic cylinder governs the tilting movement of the attached implement. By meticulously controlling the cylinder, the operator achieves precise scooping, dumping, or grading of materials as required.

For instance, excavators are outfitted with robust arms mounted on a 360-degree rotating platform. This configuration empowers them with exceptional flexibility, allowing for efficient digging, lifting, and precise material placement.

Source: CRISIL MI&A

Buckets

Earth-moving equipment relies heavily on buckets, the versatile workhorses at the end of their powerful arms. These robust containers, typically constructed from high-strength steel, come in various shapes and sizes depending on the specific application and material being handled.
The primary function of a bucket is to scoop, transport, and dump a wide range of materials. General-purpose buckets, with their rounded design, excel at scooping and transporting loose materials like dirt, sand, and gravel. For heavier materials or applications requiring more digging force, penetration buckets feature a sharper edge and a more robust design.

Beyond these basic functions, buckets offer specialized capabilities for various tasks. Sifting buckets, with a mesh bottom, are ideal for separating debris from desired materials like topsoil. Tilt buckets allow for angled dumping, useful for tasks like grading or backfilling trenches. Clamp buckets, equipped with a powerful hydraulic mechanism, can securely grasp and transport objects like logs or boulders.

Source: CRISIL MI&A

Links

Within the intricate world of earth-moving equipment, the term "link" encompasses a critical aspect of the machinery's functionality, though it doesn't designate a singular, isolated component. There exist two primary domains where linkages demonstrably contribute to the operational efficiency of these machines.

Firstly, tracked vehicles such as excavators and bulldozers rely on linkages as the very foundation of their track assembly. These linkages, meticulously crafted from high-strength metals, typically manifest as heavy-duty chains or belts. Their function entails connecting the drive sprockets positioned at the front of the machine to the idler wheels situated at the rear. The interlocking design of these links forms a continuous loop, enabling the machine's locomotion. This movement is achieved by rotating the drive sprockets, which in turn engage the ground with the treads embedded within the links.

Secondly, the impressive range of motion exhibited by the arms on many earth-moving machines, such as excavators and loaders, is facilitated by a meticulously designed system of interconnected linkages. These linkages, constructed from high-strength steel to ensure resilience in demanding environments, serve to connect the various segments of the arm (boom, stick, and bucket cylinder). Through a sophisticated hydraulic system, the precise movement of these links empowers the operator with exceptional control overextending the reach, tilting the bucket, and manoeuvring the entire arm for efficient digging, scooping, and material handling tasks.

Source: CRISIL MI&A

Body parts

Handlebar: The handlebar is a critical component which is the primary interface between the rider and the two-wheeler. It plays a crucial role in steering and manoeuvring the vehicle. The handlebar houses the grip, switches, brake levers, and clutch levers. Handlebars provides a stable and responsive interface for riders to control the direction of the two-wheeler. These are made of steel tubes for durability and cost-effectiveness through the bending and welding process.

Source: CRISIL MI&A

Side stand and centre stand: The side stand and centre stand are essential components of two-wheelers, providing stability and convenience for parking in everyday use. The side stand is a folding/retractable metal rod attached to the side of the two-wheeler. It supports the vehicle when parked, by allowing it to lean to one side without the need for external support. The side stand is primarily used for quick stops, such as parking for a short duration or when waiting at traffic signals. The centre stand is also a retractable metal frame placed underneath the chassis. It allows the motorcycle to be lifted vertically, supporting it at its centre point. The centre stand provides a stable platform for the two-wheelers, making it ideal for parking over extended periods and for performing maintenance tasks. Both side stands and centre stands are commonly found in motorcycles and scooters, providing riders with flexibility in parking basis their needs. These are made from high strength steel parts which are welded together.

Source: CRISIL MI&A

Exhaust tube: The exhaust tube is part of the exhaust system and plays a crucial role in managing the exhaust gases produced by the engine. The main purpose of the exhaust tube is to control emissions by removing exhaust gases away from the engine and filter pollutants prior to releasing them into the environment. Also, it reduces the noise generated by the exhaust gases expelled from the engine during the combustion process. Exhaust tube houses the catalytic converter and muffler which are key components in reducing the emission and noise from the exhaust system. It is made from heat resistant steel parts welded together.

Source: CRISIL MI&A

Swing arm: The swingarm is a critical component in the suspension system of two-wheelers, connecting the rear wheel to the vehicle's frame. It plays an important role in supporting the rear wheel, maintaining stability, and overall handling of the vehicle. The swingarm is primarily responsible for securing the rear wheel and facilitating the rotation of it. Also, it connects the rear shock absorber with vehicles frame, contributing to the overall suspension geometry. The swingarm also accommodates different drive systems, such as chain, or belt. Swingarms are made of steel, providing a balance between strength, durability, and cost-effectiveness.

Source: CRISIL MI&A

Wheel Rims (Roll Formed): The wheel rims provide structural support for tires, ensuring stability and performance. They are crucial for safe handling, durability, and the overall riding experience. It creates an airtight seal between the tire and the wheel, preventing air from leaking out. This is especially important for tubeless tires, he most common type used on automobiles today.

Source: CRISIL MI&A

Complete and Assembled Driver Cabins (Backhoe Loaders, Excavators, Mining Equipment)

It serves as the operator's command centre. This critical enclosure, typically constructed from high-strength steel for durability and ROPS (Roll-Overprotective Structure) compliance for safety, provides a protected and functional environment.

The cabin itself is a pre-assembled unit that arrives on the equipment chassis complete with essential features like:

- Seating: An ergonomic and adjustable operator's seat with features like armrests, lumbar support, and suspension for comfort during long shifts.
- Controls: A centralized control panel housing levers, joysticks, buttons, and switches for operating all machine functions like movement, digging, and attachment control.
- Instrumentation: A clear and informative dashboard displaying vital information such as engine speed, fuel level, hydraulic pressure, and machine alerts.
- Climate Control: A heating and air conditioning system to maintain a comfortable temperature for the operator regardless of the external environment.
- Visibility: Strategically placed windows and sometimes even mirrors to provide a panoramic view of the work area, minimizing blind spots and enhancing operational safety.

The complete and assembled driver cabin offers a secure haven (ROPS compliance, seat belts) and a comfortable workspace (ergonomics, climate control) that minimizes fatigue and optimizes operator performance.

Source: CRISIL MI&A

Canopies

Canopies serve as an indispensable element, prioritizing both operator safety and working comfort. These overhead structures, meticulously crafted from Roll-Overprotective Structure (ROPS)-compliant materials such as high-strength steel or reinforced mesh, are strategically mounted upon the machine's frame. Their primary function encompasses a two-fold approach:

Roll-Overprotective System (ROPS): Canopies function as a paramount safety feature, offering a designated protective zone for the operator in the unfortunate event of a rollover accident. The ROPS certification meticulously verifies the structural integrity of the canopy, ensuring its capacity to withstand the immense weight of the machine should it tip over. This significantly mitigates the risk of operator injury or fatality during such occurrences.

Safeguarding Against Falling Objects: Furthermore, canopies provide a crucial layer of protection from falling objects that may be present in the work environment. This encompasses loose materials, debris, or even tools that could be dislodged inadvertently during operation. By offering this safeguard, canopies shield the operator from potential hazards.

Source: CRISIL MI&A

ROPS Assembly

Earth-moving equipment prioritizes operator safety with the ROPS (Roll-Overprotective Structure) assembly. This crucial component, not a single part but a system of high-strength steel, integrates seamlessly with the machine's frame. Encasing the operator's cabin, the ROPS' primary function is to safeguard against rollovers. These incidents, though rare, can be life-threatening. Rigorously tested and certified, the ROPS can withstand the machine's weight if overturned, preventing cabin collapse, and drastically reducing injury or fatality risk. The ROPS assembly goes beyond immediate protection; it indirectly promotes seat belt use, further enhancing operator safety within the cabin.

In essence, the ROPS signifies a commitment to operator well-being, allowing them to work with confidence in the knowledge they are protected by a well-engineered safety system.

Source: CRISIL MI&A

Oil Pans

Within the intricate network of a commercial vehicle's engine system, a vital component resides at its lowest point: the engine oil sump. This element, often referred to as the crankcase oil pan, plays a multifaceted role in ensuring the smooth and efficient operation of the engine. Firstly, it functions as the primary reservoir for engine lubricant, maintaining a consistent supply for all moving parts and minimizing friction. Secondly, the engine oil sump contributes to the engine's thermal management system by facilitating the dissipation of heat generated during operation. Furthermore, it provides a crucial access point for the oil pump to draw lubricant and circulate it throughout the engine for proper lubrication.

Finally, the engine oil sump also acts as a collection point for any metal shavings or debris produced by normal engine wear, protecting the engine's internal components from potential damage. In essence, the engine oil sump, though residing beneath the hood, plays a critical role in the smooth and efficient operation of the commercial vehicle's engine.

Source: CRISIL MI&A

Spare wheel carrier assembly

Commercial vehicles, due to their size and function, often operate in remote locations or travel long distances. This makes the presence of a spare tire and a reliable system to carry it critical. The spare wheel carrier assembly fulfils this vital role by providing a secure and readily accessible location for the spare tire.

Typically constructed from durable steel or aluminium for strength and weather resistance, the spare wheel carrier assembly is mounted on the exterior frame of the vehicle, most commonly at the rear. This placement offers several advantages. First, it keeps the spare readily available for quick access during a tire change on the side of the road. Second, positioning the spare on the exterior frees up valuable cargo space within the vehicle itself. Finally, mounting the spare on the frame ensures it doesn't add significant weight to the vehicle's body or axles, potentially impacting handling, or performance.

The specific design of the carrier assembly can vary depending on the vehicle type and the size of the spare tire. Simpler designs might involve a basic bracket with straps or chains to secure the tire. More elaborate assemblies might incorporate a winch system for easier lifting and lowering of the spare, especially for larger tires found on heavy-duty trucks or buses.

Source: CRISIL MI&A

Engine cradle

Engine cradle acts as a vital support system for the powertrain. This rigid structure, typically constructed from high-strength steel, is strategically positioned at the front section of the vehicle's chassis. Its primary function is to securely house and support the engine, transmission, and sometimes even the exhaust system. By cradling these critical components, the engine cradle isolates them from the main chassis, offering several key benefits.

The engine cradle helps to dampen vibrations and noise generated by the engine during operation. This translates to a smoother and more comfortable ride for both the driver and passengers. Secondly, the cradle provides a stable platform for the powertrain, ensuring proper alignment of the engine and transmission for optimal performance and efficiency. Additionally, the use of a dedicated engine cradle simplifies the process of engine removal and installation during maintenance or repairs, reducing downtime for the vehicle.

Source: CRISIL MI&A

Brake pedal assembly

A commercial vehicle's brake pedal assembly is the vital link between the driver's foot and the vehicle's braking system. This assembly, typically constructed from durable steel components for strength and wear resistance, consists of several key parts:

- Brake Pedal: The pedal itself is the interface for the driver's foot input. It's designed for ergonomic comfort and allows for precise control of braking force.
- Pivot Point: The pedal connects to the assembly via a pivot point, enabling the pedal to move freely when depressed.
- Linkage System: A system of levers and rods transmits the force applied by the driver's foot on the pedal to the vehicle's braking system. This linkage can be mechanical or hydraulic depending on the specific braking system.

- Return Spring: A spring ensures the brake pedal automatically returns to its resting position when the driver's foot is lifted.

The brake pedal assembly serves a critical purpose in commercial vehicles. It allows the driver to modulate braking force effectively, enabling safe and controlled deceleration of the vehicle, even when carrying heavy loads.

Source: CRISIL MI&A

Crash guards

Crash guards, sometimes referred to as bull bars, are additional metal structures attached to the front of a vehicle. Their primary function is to bolster a vehicle's defence during a collision. The concept is that the crash guard absorbs some of the impact force in a head-on crash, potentially mitigating damage to the vehicle itself and even reducing injuries for the occupants. This additional structural support aims to create a buffer zone, absorbing the initial impact and dissipating a portion of the energy before it reaches the vehicle's main body.

Source: CRISIL MI&A

Floorboard

Sheet Metal floorboard is a durable, non-slip metal component providing a strong, stable foundation, enhancing safety, stability, and interior aesthetics in three-wheeled vehicles. It is a platform that provides a footrest or floor space for the driver and the passengers, front floorboard for the former and rear floorboard for the latter. It may be flat or may have raised edges to help keep passengers' feet in place. It may also have drainage holes to allow water to drain out of the vehicle.

Source: CRISIL MI&A

Windshield frame (Without Glass)

Made of steel for strength and durability it's designed to securely grip the windshield around its edges and integrate with the vehicles body work while the windshield frame is a relatively uncomplicated component it's essential for ensuring the windshields proper function and the drivers safety. The windshield shields occupants from wind and debris, enhances safety by providing structural support, maintains visibility, and aids aerodynamics for improved efficiency and reduced noise

Source: Secondary research

Load Bearing Parts

Torsion link rod

The torsion link rod is an integral part of a vehicle's suspension system, responsible for connecting the suspension components and controlling torsional forces to ensure stability and smooth handling.

Torsion rod or bar resists twisting and has a strong tendency to return to its original position when twisted. It is a long spring-steel element with one end held rigidly to the frame and the other end twisted by a lever connected to the axle. It thus provides a spring action for the vehicle.

Source: CRISIL MI&A

Shock absorber link

The shock absorber link is a crucial component of a vehicle's suspension system, connecting the shock absorber to the vehicle frame. It dampens vibrations and impacts, enhancing ride comfort and stability. These linkages, constructed from high-strength steel to ensure resilience in demanding environments, serve to connect the vehicle's

suspension system. Its robust construction and pivotal role in connecting the sway bar to the suspension make it indispensable for smooth and safe driving experiences.

Source: CRISIL MI&A

Outlook of the domestic metal products market (fiscal 2024 to 2029)

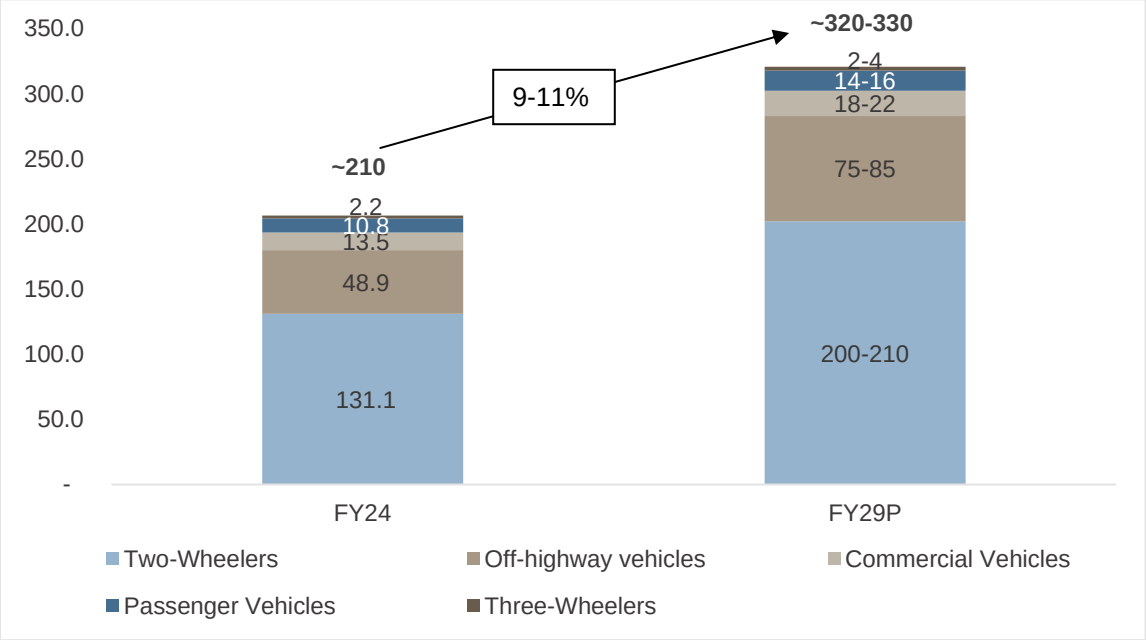
As mentioned above, metal products segment includes components such as frame/chassis, exhaust systems, stands (main, side, and centre), handlebar, swing arm, shock absorber links, torsion link rods, cabin structure assy, catering to multiple automotive vehicle segments including motorcycles, scooters, three wheelers, passenger vehicles, commercial vehicles, and earthmoving equipment (EME) in both the internal combustion (IC) and electric vehicles (EVs) segment.

Metal Products market size (fiscals 2024E-2029P)

The metal products market is estimated at ~Rs 210 billion in fiscal 2024. Metal products are expected to grow at 9-11% CAGR over the next five years though fiscal 2029 to reach Rs 320-330 billion. The market would be majorly driven by the two-wheeler segment followed by OHV. Almost all vehicle segments would log robust production growth over fiscals 2024-29. The domestic sales of two-wheelers, three-wheelers, passenger vehicles, commercial vehicles and construction equipment is projected to grow at 6-8%, 5-6%, 5-7%, 3-5%, and 10-12% respectively, over the forecast period, driving the OEM market for metal products. Key macroeconomic trends are also likely to aid demand for two-wheelers, three-wheelers, passenger vehicles and construction equipment over the medium to long term.

Key players in the metal products segment are Metalman Auto Limited, JBM Auto, Endurance Technologies, Sandhar Technologies, CIE Automotive India Limited, Craftsman Automation

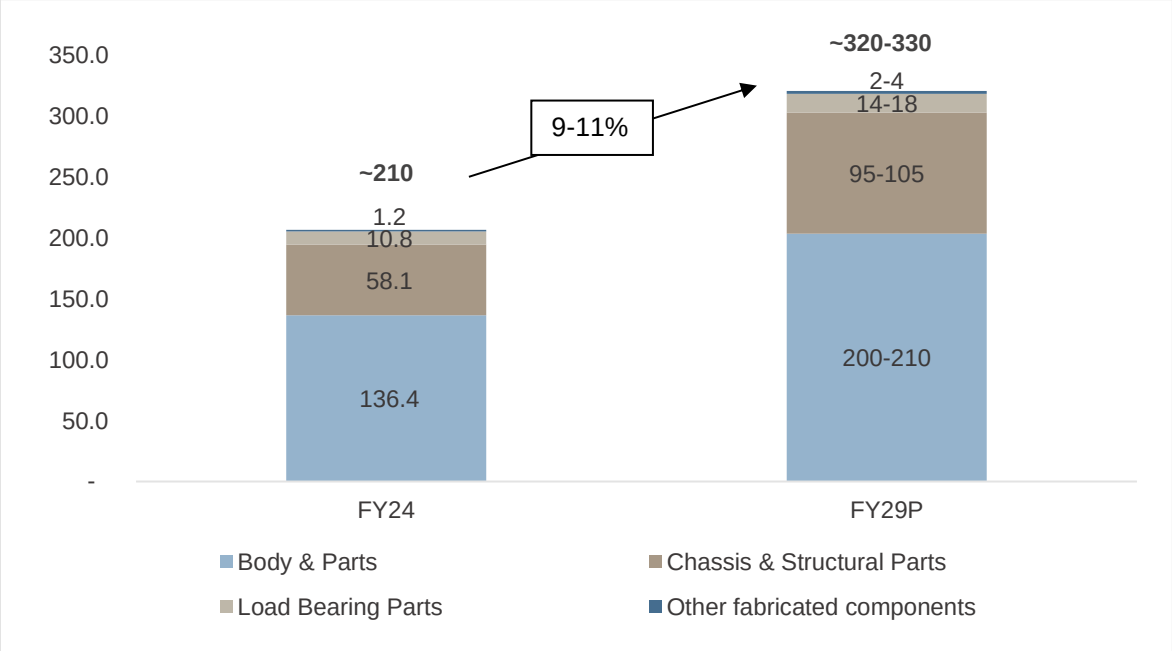
Market size (ICE and EV combined) (in Rs Bn) – Vehicle segment wise



Source: CRISIL MI&A consulting

Note: Earth Moving Equipment & Material Handling and OHV are same

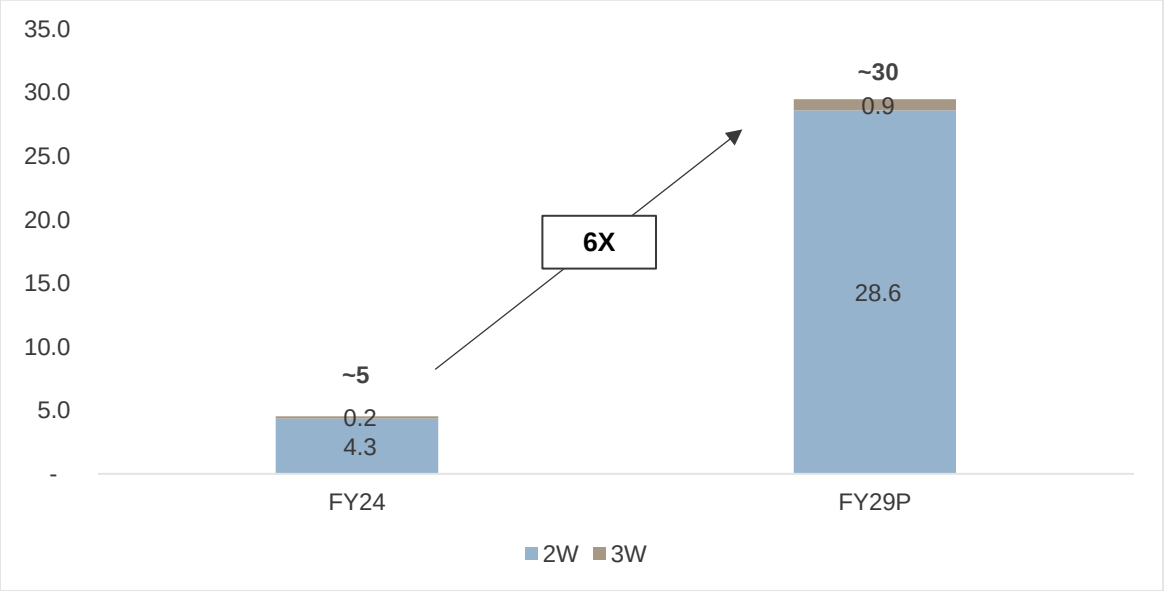
Market size (ICE and EV combined) (in Rs Bn) – Manufacturing category wise



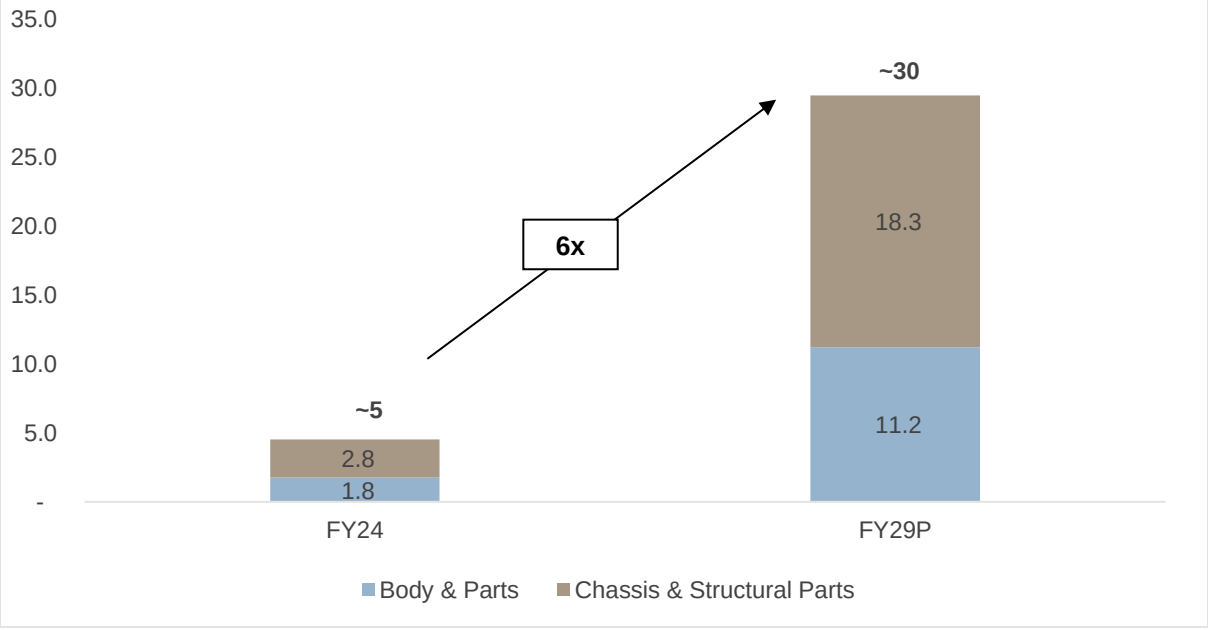
Source: CRISIL MI&A consulting

The metal products market catering EV is estimated to grow multi-fold by 6x from ~Rs 5 billion in fiscal 2024 to ~Rs 30 billion in fiscal 2029. With this, the overall contribution of metal products with respect to EV is expected to rise to ~9.0% by fiscal 2029 from ~2.5% in fiscal 2024, driven by 2W segment. Market growth in the EVs (2W, 3W, PV, CV) in terms of volume is expected to be driven by 2W, majorly the scooter segment.

Market size, only EV (in Rs Bn) - Vehicle segment wise



Market size, only EV (in Rs Bn) – Manufacturing category wise



Source: CRISIL MI&A consulting

Domestic market for EV metal products is very niche and is growing. A clear shift in consumer preference is observed in the two-wheeler market and sales of high-speed 2W EV 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 2W EV penetration is expected to reach 28-30% by fiscal 2029.

The growth in EV in the three-wheeler segment would be driven by goods vehicles in the short term as most of the fleet operators in end-use segments like FMCG, e-commerce and dairy shift to e-autos owing to the lower operating costs. Growth will be led by players in last mile delivery switching to electric three-wheelers. 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, we expect the penetration of electric 3Ws to reach 30-34% levels from the current 13.2% in fiscal 2024. Some top three-wheeler states have also banned permits for diesel vehicles, which is also expected to support three-wheeler sales. The automotive component industry is expected to gradually evolve and cater EVs in the medium term.

CRISIL MI&A consulting believes that pick-up in EV adoption will happen at much faster pace in the next five years, led by the two- and three-wheeler segments. Improving rural infrastructure impacts demand for two- and three-wheelers, thus improving the mobility in rural areas. Use of two- and three-wheelers in last-mile delivery by e-commerce players/food chains would drive demand for new vehicles as well as the components industry. Rising adoption of EVs in the PV and CV segments would also drive the metal products market. Domestic market for EV metal products is driven by the growth of the e-LCV and PVs would drive the PV segment.

12. Profiling of key automotive component players

Key player profiles

Key players in the metal products segment are [Metalman Auto Limited], [JBM Auto Ltd, Endurance Technologies Ltd, Sandhar Technologies Limited] CIE Automotive India Limited, Craftsman Automation.

Metalman Auto Limited

Key facts	Brief profile
Year of incorporation: 1986 HQ: New Delhi	Key product segments The company manufactures Sheet Metal, Tubular, Light and Heavy Fabricated Assemblies, Sub-Assemblies, Parts with all types of Surface Finishing, which can further be classified as (i) chassis and structural parts; (ii) body and parts; (iii) seating structures; (iv) cabins; and (v) load bearing parts. Metalman caters to a diverse customer base across 2W, 3W, PV, CV, AV and OHV segments and provide them with automotive and non-automotive components. 1 out of every 4 high speed EV scooters sold in the country, 1 out of every 5 2W motorcycles exported from the country and 1 out of every 10 2W sold in the country are fitted with Metalman's frames/chassis for the fiscal year ending 31st Mar 2024. It has powertrain agnostic offerings in the automotive industry serving both 2W EVs and 2W ICE OEM customers. It also has contract manufacturing facilities with dedicated assembly lines to assemble complete 2W. It is also of the key suppliers to Global OHV OEMs in the country. Metalman is one of the first metal fabrication, metal finishing and assembly companies in India [along with the manufacturing processes] It has expertise in Robotic welding, CNC Tube Bending, SPM welding, press shop, Surface finishing, Machine shop, Tool room, Laser and Gas cutting, Press brake, Tube notching. It is into fabrication and manufacturing of aesthetic-centric components for white body goods such as front and rear panels and rear covers of washing machines. It is one of the few players in the industry which is a one stop shop for sheet metal and tubular fabrication, metal finishing and assembly of components for OEMs in the automotive and non-automotive sectors.
Plant locations Metalman has grown to establish 9 - plants (Including Engineering Centre) along with 2 additional sister concerns. The plants are in Aurangabad (Maharashtra), Madhya Pradesh, Hosur (Tamil Nadu), Chennai, Punjab, Uttarakhand, Haryana. These plants are in proximity to major auto clusters, Pune/Nashik/Waluj, NCR, Chennai, Pithampur, and Hosur.	

Key clients

Customers:, , Hero MotoCorp, TVS Motor Company, , Mahindra & Mahindra, Honda Motorcycles and Scooters India Ltd, , Ather Energy, , Bajaj Auto, Gogora India Limited, BMW AG, Lear, CNH Industrial, Epiroc, JCB,LiuGong, CAMSO (Michelin), Normet,

Source: Company reports, CRISIL MI&A Consulting

Sandhar Technologies

Key facts	Brief profile
Year of incorporation: 2006 **HQ**: Gurugram, Haryana	Leading automotive components and systems suppliers, engaged in the manufacturing of a diverse range of products, with primary focus on safety and security systems for automobiles across segments. Subsidiaries- Sandhar Technologies Barcelona, Sandhar Tooling, Sandhar Strategic Systems Private Limited, Zinc Die Casting. [Product categories include automotive locking and security systems, automotive vision systems, aluminium die casting, magnesium die casting, automotive optoelectronics, polymers, painting, plating and coating, commercial tooling, helmets, assemblies, fuel pumps, filters, and wiper blades.]

Plant locations -

Sandhar operates with 37 manufacturing facilities across [8 states in India], 2 manufacturing facilities in Spain, and 1 manufacturing facility in Mexico[, Stampings, Operators Cabins and Structural Parts,]

Key clients -

Long-standing relationships with 79 Indian and global OEM customers, which include some leading companies such as Ashok Leyland, Doosan Bobcat India Private Limited, Escorts Limited, Hero Motorcorp, Honda Cars India, Komatsu India Pvt Ltd, Scania AB, TAFE Tractors, Tata Motors Limited, TVS Motor Company, UM Lohia, and Volvo. Also includes OEMs such as Caterpillar, CTS, Hyundai Construction, International Tractors, JCB, Kobelco, Mahindra and Mahindra, and SML Isuzu.

Source: Company reports, CRISIL MI&A Consulting

JBM Auto

Key facts	Brief profile
Year of incorporation: 1983 **HQ:** Gurgaon, Haryana	Key product segments JBM Auto Limited is a part of the JBM Group, a diversified business conglomerate based in India. The JBM Group has interests in various industries, including automotive, engineering and design, renewable energy, [and education] It is an end-to-end solutions provider for all business segments including 2-wheelers, 3-wheelers, passenger vehicles, commercial vehicles, farm and construction equipments. JBM Auto has a comprehensive range of auto

	components including contract manufacturing, BIW, chassis and suspension systems, pedal boxes, tubular products, and safety critical components and assemblies. Also, it claims to be the largest manufacturer of metal forming system in India and amongst the leading players globally. They use various technologies in their manufacturing processes, including cold and hot stamping, aluminium stamping, CMT welding, roll forming, laser welding, laser cutting amongst many others.
Manufacturing Capacity [] They have a manufacturing capacity of 3,000 buses per annum. 2 and 3 wheelers – Approximately 1 bn+ manufactured in totality. Passenger Vehicles – Approximately 1.5 bn+ manufactured in totality. Commercial Vehicles – Approximately 15 mn+ manufactured in totality. Farm Equipment – Approximately 1.5 mn+ manufactured in totality. **Plant locations** In India, it has 17 manufacturing facilities located in states including Karnataka, Haryana, Maharashtra, Gujarat, Madhya Pradesh, Uttarakhand, Tamil Nadu. Globally, it has manufacturing facilities in the Germany, United States, Spain, Czech Republic, South Africa, China, Hungary, Turkey, Italy.	

Source: Company reports, CRISIL MI&A Consulting

Endurance Technologies Ltd

Key facts	Brief profile
Year of incorporation: 1990 HQ: Aurangabad, Maharashtra	Key product segments The company is a leading manufacturer and supplier of aluminium die casting components (ADCC) for automobiles. Its business segment includes aluminium die casting, suspension, transmission, braking systems, and aftermarket. The company manufactures suspension, transmission, steering columns, clutches, Catalysers, silencers, and braking products, which are supplied to two-wheeler, three-wheeler and four-wheeler OEMs.
Manufacturing Capacity During FY 2022-23, aluminium alloy wheels' capacity expansion reached 4.5 million wheels per annum. Also, capacity expansions to 6.8 million brake systems and 8.1 million brake discs per annum were operationalized.	

Plant locations

[The company has manufacturing presence in India, Germany and Italy and has more than 30 manufacturing facilities. Its overseas operations are primarily through two direct subsidiaries, Endurance Amann GmbH (Germany) and Endurance Overseas Srl (Italy). They supply casting and machining products to leading four-wheeler OEMs in Europe.

Here is the comprehensive list of Endurance Technologies' manufacturing plant locations –

Domestic: Aurangabad (9), Pune (3), Pantnagar (2), Chennai (2), Halol (1), Sanand (1), Kolar (1)

International: Germany (3), Italy (8), Tunisia (1)]

Key clients

Bajaj Auto, Honda (HMSI), Hero MotoCorp, Royal Enfield, Indian Yamaha Motors, TVS motors Company, Hyundai/Kia motors Motor Company, VW Group, Stellantis, Daimler, Tata Motors Limited

Craftsman Automation

Key facts	Brief profile
Year of incorporation: 1986 HQ: Coimbatore	Key product segments Craftsman has primarily 3 business verticals – Powertrain, Aluminium products, Industrial and Engineering In powertrain, Craftsman is involved in machining critical engine and transmission components for M&HCV and tractors. The Company has presence in the construction equipment category and the M&HCV segments for the machining of cylinder heads and blocks. In Aluminium products, it is involved in Aluminium die-casting and machining business and expertise in developing Industrial components. The Industrial and Engineering (IE) segment comprises of two segments – Industrial engineering which is a play on the capex cycle (highend sub-assembly and contract manufacturing) and Storage Solution which is a proxy to India's warehousing growth. The major products are Cylinder blocks, cylinder heads, housing, cylinder camshaft, baring cam, water pump inlet pipe, air intake manifold, cooling tray, power transmission parts

Manufacturing Capacity

They have diversified manufacturing facilities like casting, short blasting, Heat treatment plant, Powder coating plant, Automated painting booth, Integrated pattern and core shop, Machine and Assembly shop.

Plant locations

Craftsman Automation own and operate 16 manufacturing facilities in India. The plants are located at Bhiwadi, Pithampur, Pune, Bengaluru, Coimbatore, Chennai, Nagpur, Jamshedpur, Faridabad with a total built up area of over 1.5 million sq. ft. The manufacturing facilities include aluminium foundries, pressure dies casting facilities, machining and allied facilities, heat treatment, fabrication, and assembly facilities.

Key clients

In Powertrain and Others segment, the key customers include Daimler India, Tata Motors Limited, Tata Cummins, Mahindra and Mahindra, Simpson and Co. Limited, TAFE Motors and Tractors, Escorts, Ashok Leyland, Perkins, Mitsubishi Heavy Industries, John Deere and JCB India.

In Aluminium Products segment, the key customers include Daimler India, TVS Motors Company, Royal Enfield, Perkins and Mahindra and Mahindra.

In industrial and engineering segment, they have clients such as Siemens and Mitsubishi Heavy Industries.

Peer comparison

Comparison of key players (Consolidated - fiscal 2024)

Parameters (₹ millions)	Metalman Auto Ltd	Craftsman Automation	Endurance Technologies Ltd	Sandhar Technologies	JBM Auto
Revenue from Operations [1]	15,075.97	44,517.3	102,408.71	35,211.08	50,093.50
Revenue Growth [2]	43.53%	39.88%	16.32%	21.05%	29.86%
EBITDA [3]	1,317.2	8,969.20	14,135.99	3,553.44	6,143.20
EBITDA Margin [4]	8.65%	20.07%	13.69%	10.06%	12.21%
Profit after tax ("PAT") [5]	500.04	3,373.3	6,804.88	1,102.61	1,937.30
PAT Margin (%) [6]	3.28%	7.55%	6.59%	3.12%	3.85%
Net Debt to EBITDA (in times) [7]	2.34	1.63	0.17	1.66	3.31
Return on equity (RoE) [9]	16.34%	22.24%	14.14%	11.53%	17.54%
Return on Capital Employed (RoCE) [10]	15.55%	21.51%	16.73%	14.90%	23.17%
Cash Conversion Cycle (in Days) [11]	35.0	67.0	19	32	23
Fixed Assets Turnover Ratio (in times) [12]	3.34	2.09	3.27	3.08	3.26

Source: Company Annual Reports, CRISIL MI&A Consulting

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. *EBITDA is calculated as Earnings before interest, taxes, depreciation and amortisation and exceptional items.*
4. *EBITDA Margin (%) is the percentage of EBITDA divided by Total Income.*
5. *Profit after tax for the year ("PAT") as appearing in the Restated Consolidated Financial Information.*
6. *PAT Margin (%) is calculated as Profit after tax for the year as a % of Total Income.*
7. *Net Debt to EBITDA ratio calculated as Net Debt divided by EBITDA. Total Debt is computed as Non-Current Borrowings Plus Current Borrowings. Total Debt minus cash and cash equivalents, bank balances other than cash and cash equivalents (including bank balances in margin money)*
8. *RoE is calculated as Total Comprehensive Income for the year divided by Average Equity for the year. Total Equity is calculated as equity share capital plus other equity.*
9. *RoCE is calculated as Earnings before interest and taxes (EBIT) divided by Capital Employed. EBIT is calculated as EBITDA minus Depreciation. Capital Employed is computed as Total Equity (equity share capital plus other equity plus non-controlling interest) plus total non-current liabilities except non-current lease liabilities and deferred tax liability.*
10. *Cash conversion cycle is calculated as inventory days plus trade receivable days minus Trade payable days. Inventory days is calculated as Inventory divided by Revenue from Operations multiplied by 365 days. Trade receivable days is calculated as Trade receivables divided by Revenue from operations multiplied by 365 days. Trade payable days is calculated as Trade payable divided by Revenue from operations multiplied by 365 days*
11. *Fixed Assets Turnover Ratio is calculated as revenue from operations for the period / year divided by property, plant and equipment.*

13. 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 and earth moving equipment and material handling 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 construction equipment's or commercial vehicles, leading to a drop in orders for Metal products and associated components (sheet metal, tubular, fabricated assemblies). The downturn in FY2020 saw a drastic 17.8%, 18.1%, 28.8% and 22% decline in two-wheelers, passenger vehicles, commercial vehicle and construction equipment sales respectively, which translated to lower demand for metal products. This contraction forced sheet metal and light heavy fabricated assembly 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, commercial vehicle and EME Industry is very closely linked to the output of the Agricultural, manufacturing and construction sectors. While the Agricultural sector has a direct dependence on the normalcy of monsoon, the manufacturing and construction 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, passenger vehicles, three-wheelers and commercial vehicles and in turn for metal products 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 metal product suppliers.

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 and EME dependent Industries

The demand for commercial vehicles and EME 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 and earth moving material handling equipments. 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 iron and steel pose significant challenges to managing costs. A sudden spike in prices, such as the increase in iron ore prices, can erode profit margins and make it difficult

to offer competitive pricing to customers. Metal product manufacturers must either absorb these costs, reducing profitability, or pass them on to customers, potentially losing business to cheaper alternatives.

Supply Chain Disruptions Volatile raw material prices 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 Russia-Ukraine war sent the commodities market into a frenzy, as regions that sourced materials from these countries went into panic mode, with surge in input costs and finished product prices for metal and steel products. The surge in export realizations sent domestic prices on a rally as well, thus impacting procurement prices for domestic consumption.

Furthermore, 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, which in turn can have a wider impact on commodity prices and inflation which can impact manufacturing costs

Skilled Labour Shortage

Skilled labour is one of the most important supply side aspects in the manufacturing sector. Training and retaining skilled workers in areas such as welding, fabricated assembly, surface finishing Industry is a key driving factor for success of any segment of the industry including Metal and Metal specific industry

Thus, inadequate availability of skilled labour can be one of the significant challenges impacting the Fabrication assemblies 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 welding and fabrication assembly sector requires a workforce proficient in welding, assembly and modern manufacturing technologies. The gap between demand and supply of such skilled labour 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 manufacturing of sheet metal and fabricated assemblies
- 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 labour. 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.

Traditional processes often involve manual labour and older machinery, which can result in longer production times and higher labour costs. In contrast, Advanced laser cutting and welding technologies provide high precision cutting and welding capabilities, reducing material waste and improving product quality. For example, many global competitors have Industrial robots equipped with advanced welding capabilities automate the welding process,

increasing productivity, consistency, and weld quality, a considerable portion of the smaller Indian foundries (MSMEs) still rely on manual operations.

Furthermore, techniques such as computer-aided design (CAD) and computer-aided manufacturing (CAM) systems enable the seamless transfer of design data to fabrication processes, reducing lead times and improving accuracy. allow to produce components with tight tolerances and consistent quality. Without these technologies, smaller Indian manufacturers may struggle to meet the stringent quality standards required by original equipment manufacturers (OEMs), particularly in export markets.

The adoption of CNC-controlled tube bending machines in automated tube bending offer precise bending of complex tubular structures, reducing manual labour and improving accuracy. Advanced electroplating and anodizing techniques provide durable and corrosion-resistant surface finishes, enhancing product aesthetics and longevity for surface finishing. These technological advancements are transforming the manufacturing of sheet metal, tubular, light and heavy fabricated assemblies, and surface finishing, leading to increased productivity, improved quality, reduced costs, and enhanced sustainability.

Policy and Regulatory Challenges

Changes in tax and duties regime

Changes in duties and tax structures present significant threats to the automotive welding, tubular fabrication and fabricated assembly 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.

The Indian government periodically revises import duties on raw materials such as steel and aluminium, which are essential. Increased costs due to higher import duties are often difficult to pass on to customers, especially in a highly competitive market. This squeeze on profit margins forces manufacturers to absorb the additional costs, potentially reducing their financial health and capacity to invest in new technologies or expansion.

Hence, changes in duty and tax structures across the automotive value chain pose significant threats by increasing costs, complicating compliance, and creating market instability.

Environmental Regulations

Environmental regulations present a significant challenge for the sheet metal, welding and fabrication 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 (MoEFandCC) has established norms for emissions from industrial plants. Industries are required to adhere to standards for pollutants such as particulate matter, sulphur 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 sheet metal, tubular fabrications and surface finishing, which may contain lubricants and other harmful substances.

Energy Efficiency and Carbon Footprint Reduction: India's National Action Plan on Climate Change (NAPCC) includes missions focused on enhancing energy efficiency and reducing carbon footprints. The Perform Achieve and Trade (PAT) scheme, part of the National Mission for Enhanced Energy Efficiency (NMEEE), covers industries like steel that supply materials for automotive metal products and assemblies. The PAT scheme sets energy consumption targets and encourages industries to adopt energy-efficient technologies.

Compliance and adherence to all these regulations (as well as a few others) often requires significant investments in new technologies and processes by the industry, which if not undertaken in a timely manner can be a challenge for the industry.

Ad hoc 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.

About CRISIL Limited

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