

The logo for ACMA (Automotive Component Manufacturers Association of India) is displayed in a bold, white, sans-serif font. The letters 'A', 'C', and 'M' are significantly larger than the 'A' and 'A' at the end, creating a distinctive, stylized appearance. The background of the entire page is a vibrant blue sky filled with the branches and blossoms of a cherry tree, with the flowers in various shades of pink and white.

Automotive Component Manufacturers
Association of India

FUTURE OF MOBILITY

Transforming to be Ahead
of the Opportunity

6ND
A N N U A L
S E S S I O N

14th September, 2022

**COMPENDIUM
OF PAPERS**





Automotive Component Manufacturers Association of India

62nd Annual Session
Future of Mobility -
Transforming to be Ahead of the Opportunity

Compendium of Papers

14th September, 2022
Hotel Taj Palace, New Delhi

Automotive Component Manufacturers Association of India

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Disclaimer : This compendium contains papers contributed by renowned consulting firms. The papers have been compiled with the intent of keeping ACMA members abreast of automotive trends in India and overseas. The views expressed in the papers are solely those of the consultants. It is not intended to be substitute for detailed research or exercise of professional judgement.

Your feedback is valuable to us. We would appreciate your compliments and suggestions in order to improve the publication. Please write to Ms. Shikha Tripathi, Deputy Director (Government Affairs & Public Policy) at shikha.tripathi@acma.in

About ACMA

The Automotive Component Manufacturers Association of India (ACMA) is the apex body representing the interest of the Indian Auto Component Industry. Its membership of over 800 manufacturers contributes to more than 85 per cent of the auto component industry's turnover in the organized sector. ACMA is an ISO 9001:2015 Certified Association.

ACMA's charter is to develop a globally competitive Indian Auto Component Industry & strengthen its role in national economic development and also to promote business through international alliances.

The automotive value chain which spans across different geographies of the country, is a large, integrated and complex network of OEMs and suppliers. Today, it contributes 6% of the country's national GDP, 49% of the national Manufacturing GDP and is responsible for over 30 million jobs. The auto component industry is dominated by SMEs, which are the key drivers of India's economic growth and the 'Make in India' program.

The auto component industry manufactures a wide variety of products including engine parts, drive transmission and steering parts, body & chassis, suspension & braking parts, equipment & electrical parts, besides others.

With the normalcy returning to business, post the pandemic and with the vehicle sales and exports gaining momentum, the Auto Component Industry registered a growth of 22% in turnover to Rs. 4.21 lakh crore (USD 56.50 billion) for the year 2021-22.

The sales of OEMs during the year 2021-22, in the domestic market stood at Rs. 3.41 lakh crore (USD 45.80 billion), growing by 21.40% when compared to the previous year.

Exports of auto components witnessed growth of 42.9% to Rs. 1.42 lakh crore (USD 19.00 billion) in 2021-22 from Rs 0.98 lakh crore (USD 13.30 billion) in 2020-21. Exports to Europe saw a growth of 39% while North America and Asia accounted for growth of 46% and 40% respectively.

The auto component aftermarket witnessed a growth of 14.50%. Its turnover in FY 21-22 stood at Rs. 74,203 crore (USD 10.00 billion) compared to Rs. 64,524 crore (USD 8.70 billion) in the previous year.

ACMA's active involvement in the trade promotion, technology up-gradation, quality enhancement and collection & dissemination of information has made it a vital catalyst for the component industry's development in India. Its other activities include participation in international trade fairs, sending trade delegations overseas and bringing out publications on various subjects related to the automotive industry.

ACMA also contributes in upgradation of manufacturing practices by skilling & mentoring of its members through various cluster programs and special projects such as 'Asset Turnover Improvement', 'Uptime Improvement', 'Zero Defect Quality' and 'Sustainable Manufacturing' among others.

ACMA is very well represented on a number of panels, committees and councils of the Government of India through which it helps in the formulation of policies and regulations pertaining to the Indian automotive industry.

For exchange of information & for co-operation in trade matters, ACMA has signed MoUs with its counterparts in Argentina, Australia, Brazil, Canada, Egypt, France, Germany, Hungary, Iran, Italy, Japan, Kazakhstan, Malaysia, Mexico, Nigeria, Pakistan, Poland, Russia, South Africa, South Korea, Spain, Sri Lanka, Sweden, Taiwan, Thailand, Tunisia, Turkey, UK, Italy, USA and Uzbekistan.

Further information and data on the Indian automotive industry is available on the ACMA Website: www.acma.in

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62nd Annual Session

Future of Mobility - Transforming to be Ahead of the Opportunity

Contents

	T O P I C	Page No.
▶	Future of Mobility - Transforming to be Ahead of the Opportunity	06
▶	An Update on Indian Auto Component Industry FY 2021-22 by ACMA	10
▶	Outlook on Indian Economy and Automobile Industry by CRISIL	16
▶	Incentives And Schemes to Strengthen the Automobile Sector by EY	52
▶	Disruptive dimensions of mobility in India's new "Green Age" by Eninrac	59
▶	Transformation Trends & Growth Opportunities in the Global Automotive Aftermarket by Frost & Sullivan	73
▶	Key Trends Shaping The Indian Auto Sector by Grand Thornton	90
▶	Advertisement of Sponsors	134

Future of Mobility - Transforming to be Ahead of the Opportunity

The Auto Component Industry in India: Future of Mobility- Transforming to be Ahead of the Opportunity

An Introductory Note

The global automotive industry has demonstrated great resilience over the last 2 years. The pandemic and, more recently, the war in Ukraine, exacerbated the slowdown in global sales that had set in pre COVID. However, despite near-term supply disruptions, the long-term prospects for the industry remain strong. Global sales of passenger vehicles are expected to rebound to peak levels by the middle of this decade. Emerging markets such as India will lead the way, along with China.

While there is cause for optimism, the push for clean mobility and corresponding growth in the adoption of electric vehicles could disrupt the automotive landscape over the course of this decade. McKinsey and Company has published a report capturing its findings from a study for the Automotive Component Manufacturers Association (ACMA). The auto component industry in India: Transforming to be Ahead of the Opportunity focuses on the following:

- a) Expected disruption caused by Electric Vehicle (EV) transition on portfolios of Internal combustion engine (ICE) component manufacturers
- b) Whitespace opportunities and new value pools expected to be generated from the EV Bill of material (BOM) requirements
- c) Framework of transformative strategies that Indian automotive component manufacturers could consider to adapt to these potential shifts
- d) Role of different industry stakeholders and the government in enabling this transformation agenda

TRANSFORMATIONAL STRATEGIES AND IMPERATIVES FOR THE AUTO COMPONENT MANUFACTURERS TO BE AHEAD OF OPPORTUNITY

In India's case, the total cost of ownership is likely to be more attractive for electric two- and three-wheelers (E2W, E3W), than for passenger or heavy commercial vehicles (PVs and HCVs). Sales of new EVs could grow to 50 percent and 70 percent respectively for E2Ws and E3Ws by 2030. Internal combustion engines (ICE) will continue to dominate the Indian passenger vehicles (PV) and heavy commercial vehicles (HCV) landscape, with slower electrification. Electric PVs and HCVs are expected to account for 10 to 15 percent and 5 to 10 percent of new vehicle sales respectively by 2030.

According to early estimates, a transition to EVs could impact up to 50 percent of ICE bill of material (BOM) components. This could disrupt the portfolio of incumbents in traditional ICE component categories. This disruption could be an opportunity too – creating multiple whitespaces for companies to cater to the new EV BOM needs and generate avenues to serve markets outside India in both ICE and EV component categories. These will represent new or expanded value pools, which players can capture by pivoting and diversifying with agility.

¹ Projections by the McKinsey Center for Future Mobility

To adapt to these shifts, three broad strategy frameworks for Indian automotive component manufacturers, which industry could customize as per their unique starting points, capabilities, and challenges:

1. Continuous improvement and expansion in traditional ICE play within India – a USD 35 to 45 bn opportunity by 2030
 - o Broaden across opportunities within the automotive market, e.g., 2W/3W suppliers (facing early electrification) pivoting into segments that are going gradually electrify (e.g., PV/HCV).
 - o Capture opportunities in automotive-like adjacent sectors e.g., construction and mining equipment, rolling stocks for railways/metros, defence sector, etc. all of which are growing and have a sizable market.
2. A global expansion within current ICE categories – a USD 35 to 50 bn opportunity by 2030
 - o Expand exports on the strength of shifting supply chains, as companies seek greater resilience by diversifying beyond traditional geographies. Indian companies could capture areas where India has traditional advantages and exports are growing faster than competing suppliers, e.g., forgings, castings, gear box parts, suspension parts, axles, wheel rims, etc.
 - o Make the most of the global component manufacturing rebalancing opportunity due to electrification. With faster EV penetration, the US and EU markets will likely lose economies of scale to locally manufacture traditional component categories (forgings, castings, etc.) due to low demand volumes and high variety. India-based players could serve these markets, leveraging the low labour-cost advantage.
3. Innovation in newer opportunities and a global play – a USD 25 to 40 bn opportunity by 2030
 - o Occupy emerging white spaces in EV categories, e.g., supply chain of battery cell, battery pack manufacturing, e-motor supply chain, e-axle/reducer, electricals and electronics for EVs and charging infrastructure.
 - o Expand into downstream service use-cases and their delivery, especially connectivity, where India has advantages to make global play – software capabilities, application engineering capabilities, lower cost base.

NECESSARY STAKEHOLDER ACTION

This transformation to stay ahead of upcoming disruptions could be a success for the Indian automotive industry with the concerted support of all stakeholders.

- The government could spur local manufacturing and exports:
 - Provide incentives targeted at the respective stakeholder groups e.g., purchase-linked export-incentives for IPOs, PLIs for OEMs, export incentives for component manufacturers, etc.
 - Provide stable policy paradigm and certainty to longevity of schemes e.g., FAME, GST support, PLI, etc.

² Based on analysis of 6-digit EXIM (HSN code) data

- Support companies to access technology through enabling tie-ups and joint ventures, and further incentivizing investments
- Enable direct investment in skilling-up
- Specifically for tapping the exports opportunity, a dedicated multi-stakeholder task force (comprising ACMA, SIAM and the Government of India) could systematically enable and empower industry players, e.g., through OEM connects, cross-border M&A, shifting of manufacturing, policy support, trade agreements, etc.
- The supplier community could embrace and invest in new technologies, quickly upskill their managerial and labour force, and drive localization by forging strategic partnerships and taking advantage of government incentives.

Disruptions, especially through electrification of mobility, are inevitable. While this disruption brings some headwinds, it also presents new possibilities for Indian suppliers to expand both domestically and in global markets, in traditional categories and in newer EV segments. Indian auto component manufacturers could benefit from dedicating management bandwidth and resources to proactively harness these opportunities in the future of mobility.

**An Update on Indian
Auto Component Industry FY 2021-22**

by

ACMA



Automotive Component Manufacturers Association Of India

An Update on Indian Auto Component Industry

FY 2021-22

Snapshot of Indian Auto Component Industry – FY 2022

Turnover:
USD 56.5 Billion
INR 420,621 Crore

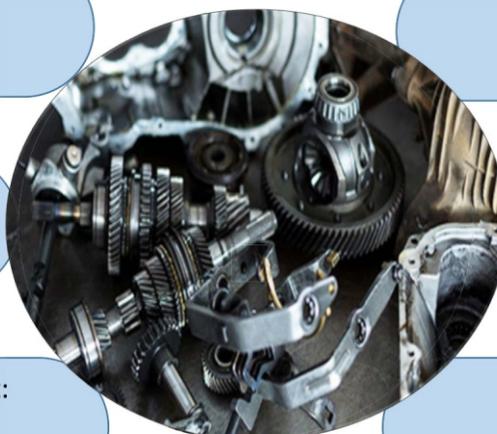
Contribution to GDP :
2.3%

Exports :
USD 19 Billion
INR 141,550 Crore

Share in India's Exports:
4.5%

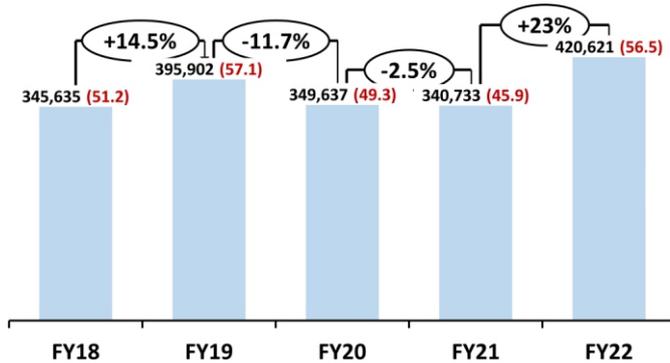
Domestic Aftermarket:
USD 10 Billion
INR 74,203 Crore

Employment :
50 Lakh (Approx)



FY 2022 : Auto Components Industry Performance

Size of industry | INR Cr (USD Bn)



The auto-components industry has grown 23% y-o-y on the back of strong exports performance & replacement market growth



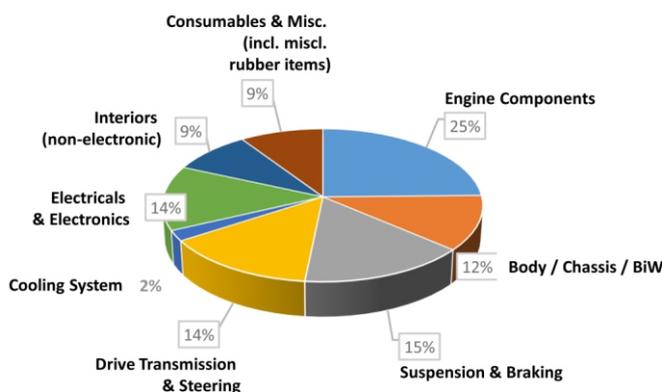
Source: PwC research, CRISIL, SIAM, includes Tractors, Construction Equipment

FY22 – Auto components industry performance

- PV and CV production increased by ~20% and ~30% respectively due to **increased demand and fewer supply chain disruptions** (vs. FY21)
- Raw material cost per unit up by ~11% (vs. FY21) Y-o-Y due to global supply constraints in H2 FY22 caused by **geo-political tensions and lockdowns in China**
 - Steel **40%**
 - Aluminum **54%**
- Shift in preferences:** Customers have started to move towards **larger/more powerful vehicles** across all segments;
 - UVs (amongst PVs) – 49% in FY22 (vs. 39% in FY21)
 - M&HCVs (amongst CVs) – 33% in FY22 (vs. 28% in FY21)
- Auto component sales to EV-sector stood at Rs.3,520 cr.; ~1% of auto component sales to the OEMs

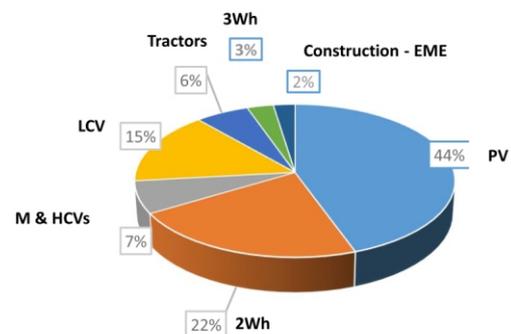
Product range and Auto Components Supply to OEMs

Component Sales By Category:



Total Sales: Rs.421,620 Cr. (USD 56.5 Bn)
Growth:23%

Component Sales By OEM Segment:

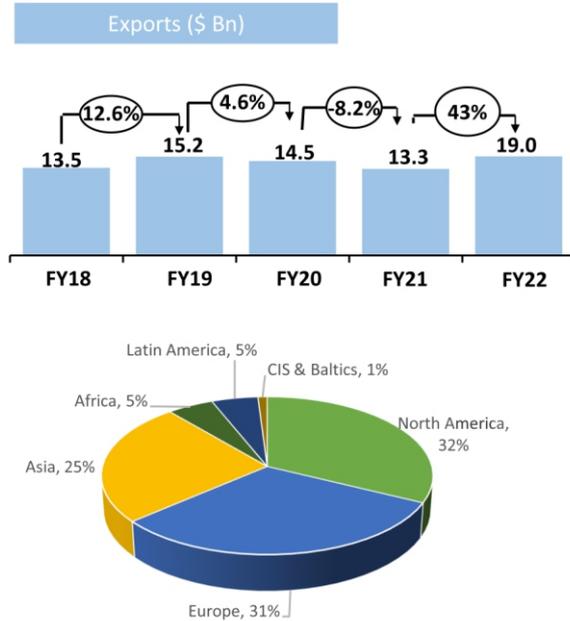


Total Sales to OEMs: Rs.341,203 Cr. (USD 45.8 Bn)
Growth:22%



Source: PwC research, CRISIL, SIAM

Exports – Auto Component Industry : FY 22

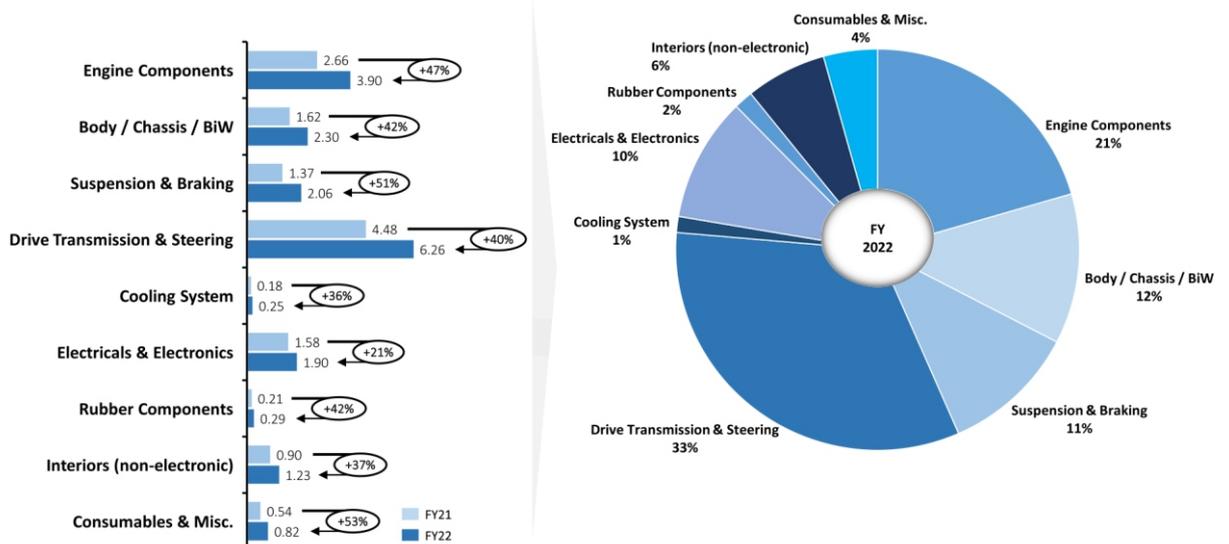


Top 10 Countries	Share of Ex-FY22
U S A	28%
GERMANY	8%
THAILAND	4%
BANGLADESH	4%
U K	4%
TURKEY	4%
ITALY	4%
BRAZIL	4%
MEXICO	3%
CHINA P RP	3%



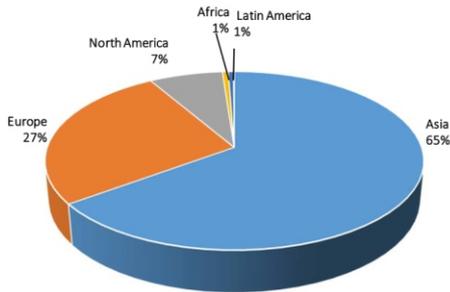
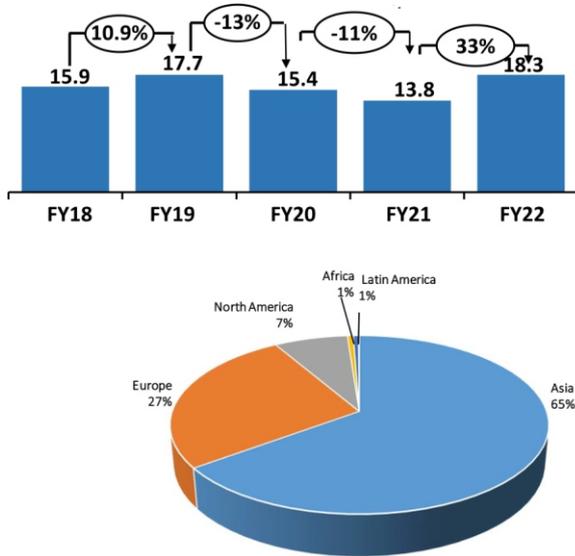
■ North America ■ Europe ■ Asia ■ Africa ■ Latin America ■ CIS & Baltics

Key Auto Components Exported



Imports – Auto Component Industry – FY 22

Imports (\$ B)

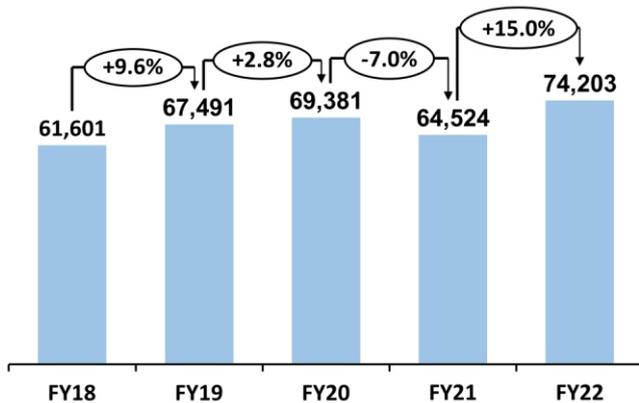


Top 10 Countries	Share of Im-FY22
CHINA P RP	30%
GERMANY	11%
KOREA RP	10%
JAPAN	9%
U S A	7%
THAILAND	6%
SINGAPORE	4%
ITALY	3%
U K	2%
FRANCE	2%



Indian Auto Component Aftermarket - FY 2022

Aftermarket | INR Cr



FY22 Aftermarket

- Industry size surpassed pre-pandemic levels due to a combination of factors;
 - More vehicles on road
 - Prolonged usage of vehicles
 - Increase in demand of second-hand vehicles
 - Increase in commodity prices
 - Changing Automotive ecosystem - emergence of new sales channels like online e-retailing and multi brand outlets (MBOs)



Summary: FY 2022 vs FY 2021

Figures in INR Crore	FY 2021	FY 2022	Growth Rate
Auto Components Supply to OEMs	279,919	341,203	21.9%
Aftermarket	64,524	74,203	15.0%
Exports	98,673	141,550	43.5%
Imports	102,382	136,335	33.2%
Industry Turnover	340,733	420,621	23.4%

Figures in USD Billion	FY 2021	FY 2022	Growth Rate
Auto Components Supply to OEMs	37.7	45.8	21.4%
Aftermarket	8.7	10.0	14.5%
Exports	13.3	19.0	42.9%
Imports	13.8	18.3	32.6%
Industry Turnover	45.9	56.5	22.9%



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Outlook on Indian Economy and Automobile Industry

by

CRISIL

An S&P Global Company

Contents

- Economy
- Automobile industry
- Passenger vehicles
- Commercial vehicles
- Two-wheelers
- Tractors
- Electric Vehicles

Economy

Real GDP growth

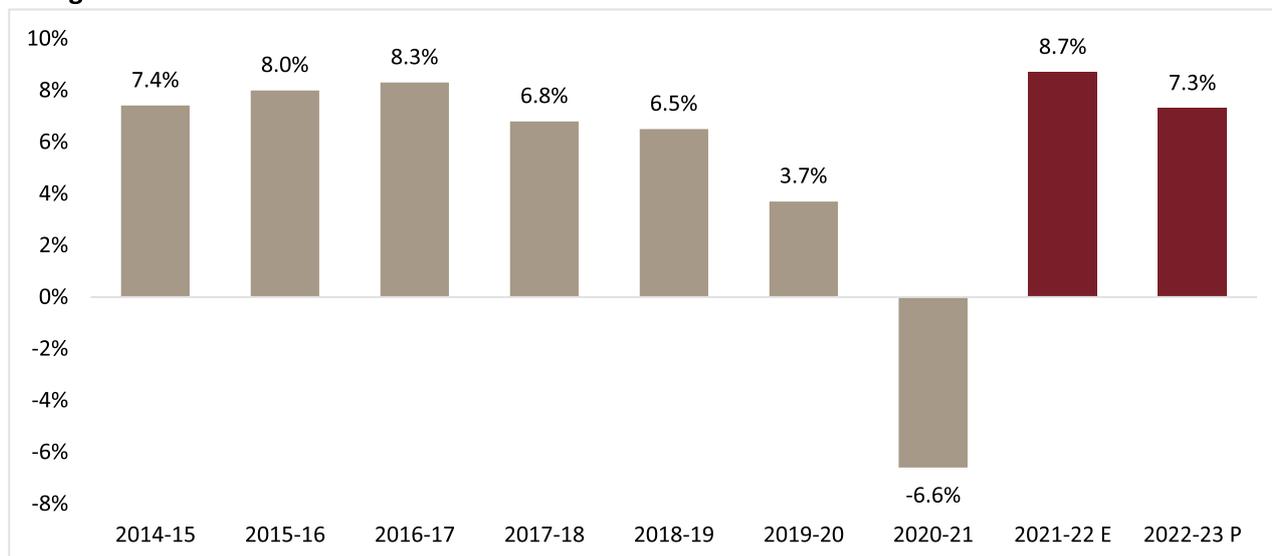
The latest provisional estimates released by the National Statistical Office peg India's real gross domestic product (GDP) growth at 8.7% last fiscal, a tad slower than the second advance estimate of 8.9% released in February 2022. In absolute terms, real GDP for fiscal 2022 is now estimated at Rs 147.35 lakh crore, marginally less than Rs 147.72 lakh crore estimated earlier. The downward revision reflects a minor correction in the first to third quarter GDP numbers, and a mild impact of the third Covid-19 wave and the Russia-Ukraine war in the fourth quarter.

While the provisional estimates show a mild reduction in the overall size of the GDP, estimates of private final consumption expenditure (PFCE) and gross fixed capital formation (GFCF) – the biggest two demand-side drivers – were marginally notched up. The latter suggests the government's continued focus on capital expenditure (capex). PFCE at Rs 83.8 lakh crore in fiscal 2022, however, is still just 1.4% (compared with 1.2% earlier) above the fiscal 2020 level and the slowest to recover. Moreover, it faces strong headwinds from rising inflation. Given the sharp rise in international commodity prices following the Russia-Ukraine war, India's import bill surged at a faster rate than exports, resulting in a greater drag on the economy in fiscal 2022 than estimated earlier.

On the supply side, agriculture maintained a robust performance (with real growth rising to 4.1% in the fourth quarter from 2.5% in the third quarter) despite some negative impact of heat waves on crop output to an extent. Healthy growth in contact-intensive services also provided support to overall supply-side growth in the fourth quarter, although they faced some pressure on account of the Omicron wave. These services, such as trade, hotels, etc., finally crossed the pre-pandemic mark (Rs 7.30 lakh crore in the fourth quarter of fiscal 2020), growing 5.3% on-year to Rs 7.42 lakh crore in the fourth quarter of fiscal 2022. That said, for full fiscal 2022, these were still 11.3% below the pre-pandemic level i.e., the fiscal 2020 level which means greater resumption of these activities would provide a positive spin to growth this fiscal.

On the other hand, the manufacturing sector contracted (-0.2% on-year in the fourth quarter, down from 0.3% in the third quarter), largely reflecting a sharp rise in input prices owing to a surge in international commodity prices and supply disruptions due to the Russia-Ukraine war

GDP growth review and outlook



Note: E - Estimated and P - Projected

Source: National Statistics Office (NSO), IMF, CRISIL Research estimates

The growth outlook for fiscal 2023 is fettered by multiple risks. Global growth is projected to slow, as central banks in major economies withdraw easy monetary policies to tackle escalating inflation. This, together with high commodity prices, especially oil, translates into a trade shock for India. At the same time, higher and broad-based inflation domestically will be a drag on consumption revival. Uncertainty due to the Russia-Ukraine conflict could put some of the private capex plans on the back burner. In fact, higher input prices could also result in lower government capex, which has already seen the fiscal space shrink with attention shifting to relief measures to fight rising inflation. Amid this gloomy scenario, the forecast of a normal monsoon comes as a silver lining. We also expect the growing momentum in contact-intensive services to be broad-based and support growth. On balance, CRISIL maintains its real GDP growth projection for fiscal 2023 at 7.3%, with risks skewed towards the downside.

Macroeconomic outlook for fiscal 2023

Macro variables	FY21	FY22	FY23P	Rationale for outlook
GDP (% , y-o-y)	-6.6%	8.7%	7.3%	Given the large output loss due to the pandemic, it is important to note that GDP is only 1.5% above the pre-pandemic (fiscal 2020) level Gross value added – the supply-side and a firmer measure of the economy – rose 8.1% in fiscal 2022 (down from the

Macro variables	FY21	FY22	FY23P	Rationale for outlook
				previous estimate of 8.3%) compared with a 4.8% contraction in fiscal 2021 Higher inflation, monetary policy tightening, dormant private capex growth, the power crunch and a slowdown in global growth are medium-term headwinds that are expected to restrict the growth outlook for fiscal 2023 at 7.3%
Consumer price index-linked (CPI) inflation (% , y-o-y)	6.2%	5.5%	6.8%	High food prices in some categories and rising commodity prices suggest inflationary pressures would ease only gradually. The demand push from the budget could also keep core inflation sticky.
10-year government security yield (% , March-end)	6.2%	6.8%	7.5%	Pressure will be maintained by a high supply of G-secs. The Centre's gross market borrowing is estimated at Rs 14.3 lakh crore in fiscal 2023 compared with Rs 11.3 lakh crore the previous year. Due to these factors, we expect the 10-year G-sec yield to average 7.5% in March 2023 compared with 6.8% in March 2022.
CAD/GDP (%)	-0.9%	1.2%	3.0%	The surge in crude oil and commodity prices this year (exacerbated by the persisting Russia-Ukraine crisis) will push up the value of imports significantly this fiscal. CRISIL expects Brent crude oil prices to average \$105-110/barrel in fiscal 2023 compared with \$80/barrel in fiscal 2022. Further, supply chain disruptions due to the Russia-Ukraine conflict and China's zero-Covid-19 policy are likely to result in high shipping/freight costs, driving the value of imports even further. On the other hand, external demand for India's exports will slow, as global growth is expected to moderate this year
Rs/\$ (March, average)	72.8	76.2	78.0	A strengthening dollar and a widening trade deficit will put downward pressure on the rupee.

Note: P- Projected

Source: Reserve Bank of India (RBI), NSO, CRISIL Research

Tightening vibes: Assessing the monetary policy's impact on financial conditions so far

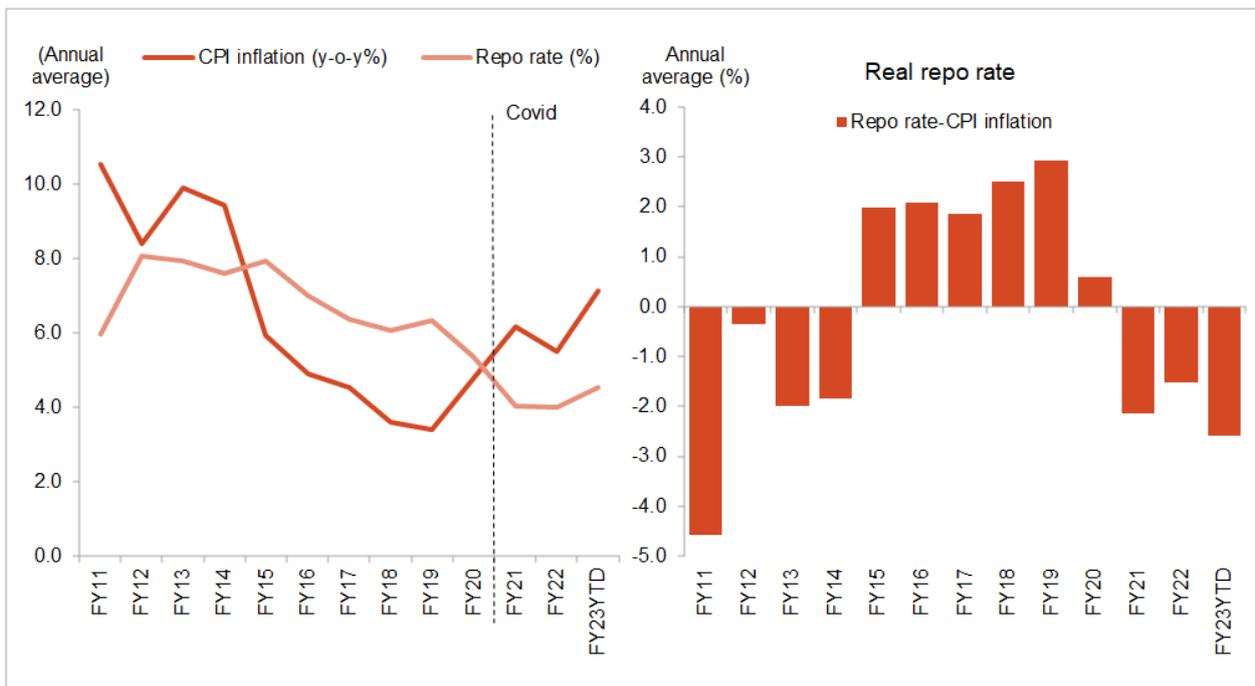
Financial markets have seen significant volatility this year. What started as baby steps towards monetary policy tightening picked up speed as inflation soared across the world in the aftermath of the Russia-Ukraine conflict that led to massive supply disruptions and escalation in energy and commodity prices. Global growth continues to face multiple headwinds, including a decisive shift in the monetary policy stance towards taming surging inflation from supporting growth. For an

emerging market like India, this has meant capital outflows and pressure on the currency despite steady monetary tightening by the Reserve Bank India (RBI).

After frontloading of rate hikes so far, the domestic monetary policy is at a crossroads. The minutes of the last Monetary Policy Committee (MPC) meeting highlight that the members regard inflation as unacceptably high. Since the last MPC meeting, inflation has softened a bit, but it would be premature to lower the guard.

The inflation trajectory and global financial conditions still appear murky, indicating that the RBI's policy actions will continue to be data dependent. We expect the RBI to raise the repo rate by another 25 basis points (bps) in its September meeting; beyond that its actions will be guided by inflation dynamics and the US Federal Reserve's (Fed) actions in the second half.

Repo rate on the rise, but remains negative in real terms so far



Note: FY23YTD refers to April-July 2022 average; Real policy here refers to ex-post rate based on contemporaneous CPI inflation
Source: RBI, NSO, CEIC, CRISIL

While international prices for critical commodities such as crude oil, edible oils and wheat have eased, they have remained higher than last year so far, implying continued broad-based pressure on retail prices. The intensity and distribution of monsoon also has to be monitored, especially as food supplies are tight. A well-distributed monsoon can help ease inflation in the second half.

The RBI's policy tightening is also likely to reduce pressure on the rupee from the widening current account deficit (CAD), while aggressive monetary policy tightening by major advanced economies could impart volatility to capital inflows. So far, the Fed has indicated its sole focus is on fighting inflation, which remains at decadal highs and way above its target. S&P Global expects the Fed rate to peak at 3.50-3.75% by 2023, the highest since 2007.

These factors will continue to lend a tightening bias to domestic financial conditions. If the repo rate reaches a terminal rate of 5.75%-6.0%, it will only touch the May 2019 level of 6.0%. We expect the real repo rate to move into positive territory only by the fourth quarter of this fiscal. And as monetary actions impact the real economy with a lag, their impact will only be felt towards the end of the fiscal and the next one.

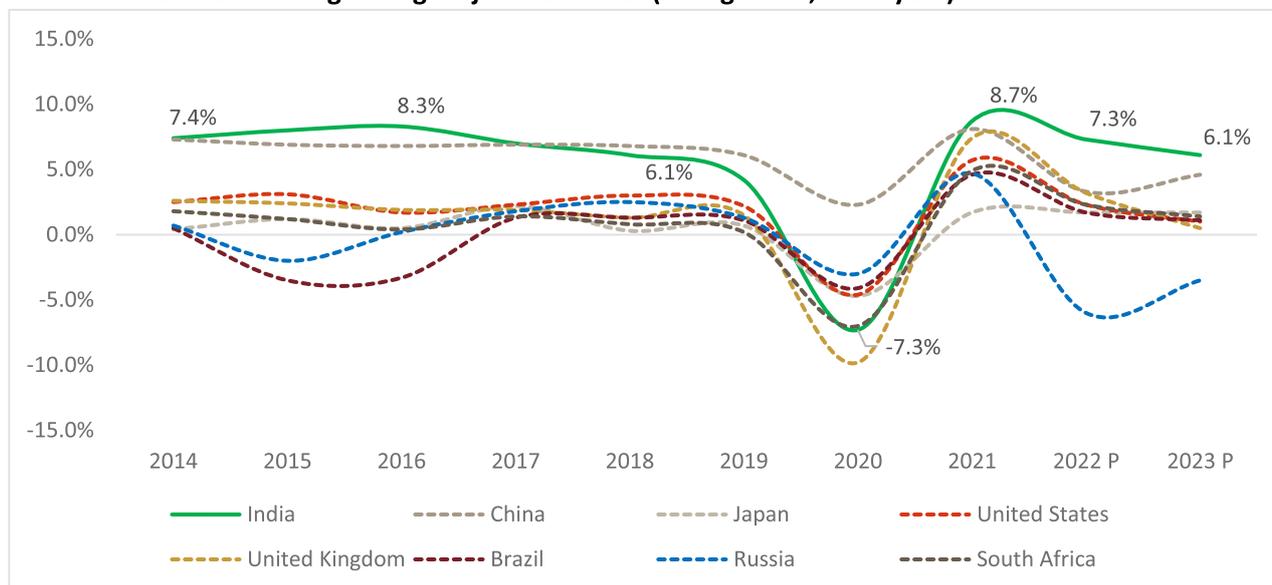
Caught in crosswinds

The word recession is being bandied around the world as growth slackens and inflation cools. The jury is still out on that one though. Nevertheless, GDP data for the second quarter of the calendar year for major economies was largely in line with forecasts of an impending global growth slowdown. GDP contracted for the second consecutive quarter in the United States (US), and declined in the second quarter in the United Kingdom (UK), which is projected to enter a recession by year-end. Further, GDP slowed in China as well, with the third quarter continuing to show signs of weakness.

With slowing demand, there are signs of inflation cooling: international commodity prices, particularly of Brent crude and metals, have declined from their 2022 highs owing to concerns over the demand outlook. The signs are evident for the US and Japan, where headline inflation slowed in July. However, the worst is probably yet to come for the UK, with the central bank forecasting double-digit on-year inflation by October.

Thus, even as supply-side inflation pressures ease, demand-side inflation drivers are also seen to be softening, nudged down by higher prices and reduced consumer purchasing power. Yet, inflation remains much higher than the targets set by respective central banks. Hence, their battle using the tool of monetary policy tightening seems far from over.

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



Note: GDP growth is based on constant prices, P: Projected

Source: IMF (World Economic Outlook – July 2021 update), CRISIL Research

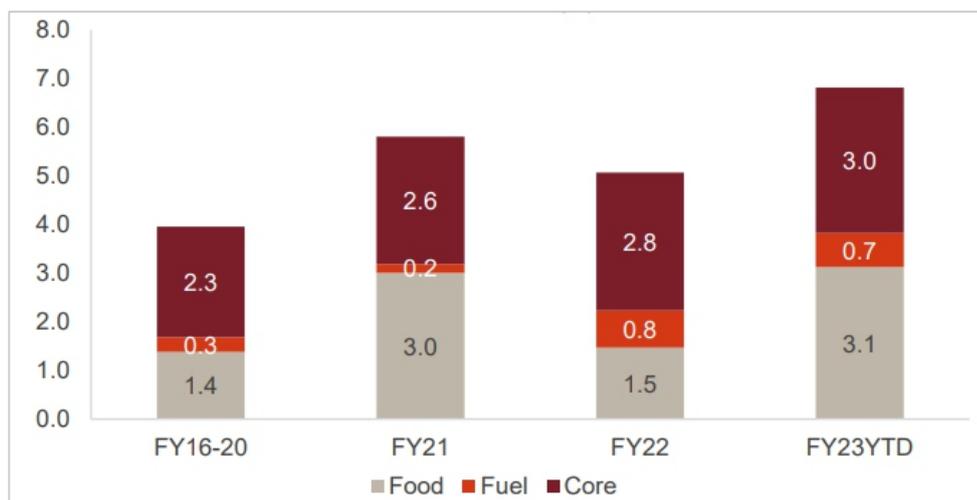
Inflation eases a touch, IIP ticking along well

Inflation, as measured by the Consumer Price Index (CPI), declined to 6.7% on-year in July from 7.0% the previous month. Food drove the moderation in inflation, while non-food inflation rose. Headline inflation remains above 6%, the upper limit of the RBI’s target range, for the seventh month in a row.

CPI inflation eased to 6.7% on-year in July from 7.0% the previous month, but was higher than 5.6% a year ago.

Inflation eased in both rural (6.8% in July versus 7.1% previous month) and urban areas (6.5% vs 6.9%).

Food has become the top contributor to CPI inflation this fiscal



Source: NSO, CEIC, CRISIL Research

Note: FY23 YTD refers to April-June 2022

How key items saw inflation move

CPI inflation for **food and beverages** combined slowed to 6.8% on-year in July from 7.7% the previous month.

- The moderation in food inflation was driven by softening vegetable, edible oil and protein prices
- Vegetables - the most volatile category - saw inflation easing to 10.9% in July from 17.3% the previous month, as supplies of major items, such as tomatoes, recovered after the heatwave
- Edible-oil inflation fell significantly to 7.5% compared with 9.4% the previous month and 32.5% a year ago - benefitting from a high base, falling global prices, and domestic manufacturers passing on import duty cuts to consumers. International edible oil prices fell 13.1% on-month in July, but remained 7.3% higher on-year
- Inflation fell for protein items, such as milk (5.8% vs 6.1%) and eggs, meat and fish (2.3% vs 7.3%). While pulses inflation turned positive, it remained subdued (0.2% vs -1.0%)
- However, cereal inflation rose for the second consecutive month (6.9% vs 5.7%), driven by both wheat and rice products

- Prepared meals, snacks and sweets saw a sharp rise (7.5% vs 6.7%), reflecting increasing passthrough of cost pressures by manufacturers

Fuel inflation remained in double digits at 11.8% in July compared with 10.1% the previous month.

- Fuel inflation rose despite a high base, driven by rising liquefied petroleum gas (23% vs 21.3%) and kerosene (108.8% vs 99.1%) prices
- However, excise duty cuts have benefitted prices of petrol (0.3% vs 5.4%) and diesel (- 2.4% vs 0.7%)
- Brent crude prices eased 9.3% on-month to \$108.9 on average in July, but were 46.4% higher on-year

Core inflation remained sticky at 6.0% in July compared with 6.0% in June and 5.8% a year ago

- The rise in core inflation was capped by transport and communication (5.6% vs 6.9%) with falling petrol and diesel prices
- Excluding transport and communication, however, core goods inflation rose (7.5% vs 7.2%). Items of clothing and footwear, FMCG goods such as soap, washing powder, and durable goods such as fans, refrigerators, and automobiles saw the impact of rising inflation
- Services inflation is also catching up (5.2% vs 5.1%), driven by education, cinema tickets, and internet expenses.

Poor bearing the impact of inflation the most

The impact of inflation varies across income groups, as the share of spending on food, fuel and core categories differs across classes. Essential items, such as food and fuel, occupy a greater share in the consumption basket of people having lower incomes.

Using data from the National Sample Survey Organisation, we mapped expenditure baskets of three broad income groups - bottom 20%, middle 60%, and upper 20% of the population - with July inflation trends. The table below highlights the impact of inflation on each income class.

The poor continue to bear the brunt of inflation more than their richer counterparts, as inflation on food and fuel items remains higher than core items.

CPI inflation across income classes (on-year, %)

Income Segment	July 2022	
	Rural	Urban
Top 20%	6.7	6.4
Middle 60%	6.9	6.8
Bottom 20%	7.0	7.2

Source: NSSO, National Statistics Office (NSO), CEIC, CRISIL

Inflation outlook

CPI inflation has been easing gradually since the peak of 7.8% in April. Relief has come from the dissipating impact of heatwave (on food prices), falling international prices (across food, energy and industrial commodities), and government interventions (duty cuts on edible oil imports and transport fuels). A fall in food and transport fuel inflation has helped ease household inflation expectations, as indicated by the RBI’s August survey. Falling international commodity prices have eased cost pressures for producers to some extent.

However, a number of pressure points remain:

1. Even as the monsoon continues to be normal, sowing is lower on-year for major kharif crops, such as rice and arhar. Wheat supplies are expected to remain tight until fresh rabi supplies after March. The Food and Agriculture Organization’s (FAO) global food price index also remained 13.1% higher on-year in July
2. Producers are expected to pass through costs to consumers to a greater extent amid recovering demand. The RBI’s latest surveys of manufacturing and services sectors indicate firms would increase selling prices in the remainder of the fiscal

Due to these factors, we retain our CPI inflation forecast at 6.8% for fiscal 2023.

IIP displays healthy double-digit growth

IIP rose 12.3% on-year in June, down from 19.6% in May. This is still a healthy pace of growth, and the moderation from May is mostly a reflection of waning of the favourable base effect that led to a spike in the May IIP print. In fact, on a sequential basis, i.e., on-month movement in the de-seasonalised series, which takes care of the base effect and seasonal variations, IIP growth improved to 1.3% on-month in June, from 0.4% in May.

The sequential improvement in IIP was largely premised on the healthy growth in manufacturing sector output. Having the highest weight of 77.6% in IIP, manufacturing moves the needle for the overall IIP. On the other hand, the other two segments — mining (14.4% weight) and electricity (7.9% weight) — registered a sequential decline in output. This trend could be attributed to the onset of monsoon season in June, which likely slowed down parts of mining activity and assuaged the excessive electricity demand in the earlier months on account of the heatwave.

The performance of the manufacturing sector was better than expected, as some of the indicators, such as manufacturing PMI (which fell to a 9-month low of 53.9 in June, from 54.6 in May), were indicative of a slowdown in the momentum. The robust manufacturing performance also seems to suggest easing of supply-related issues amid improving domestic demand and some support from external demand as indicated by a sequential rise in some of India's key core export items, such as engineering and pharma goods, in June.

IIP outlook

Statistically, annual IIP growth may still moderate next month, as the base effect continues to normalise. Sequentially, however, industrial activity should start rising gradually in line with improving domestic demand, as the economy moves past the pandemic impact and festive-related demand kicks in. Softening in inflation should help support consumption demand, albeit the improvement will be gradual as the pass-through of earlier higher prices remains incomplete. The RBI's latest industrial outlook survey for the manufacturing sector pointed towards optimism, as suggested by the improvement in the business expectations index to 137.7 in the second quarter of fiscal 2023 from 134.7 in the previous. That said, the manufacturing sector could face headwinds from a slowdown in global demand and hence exports.

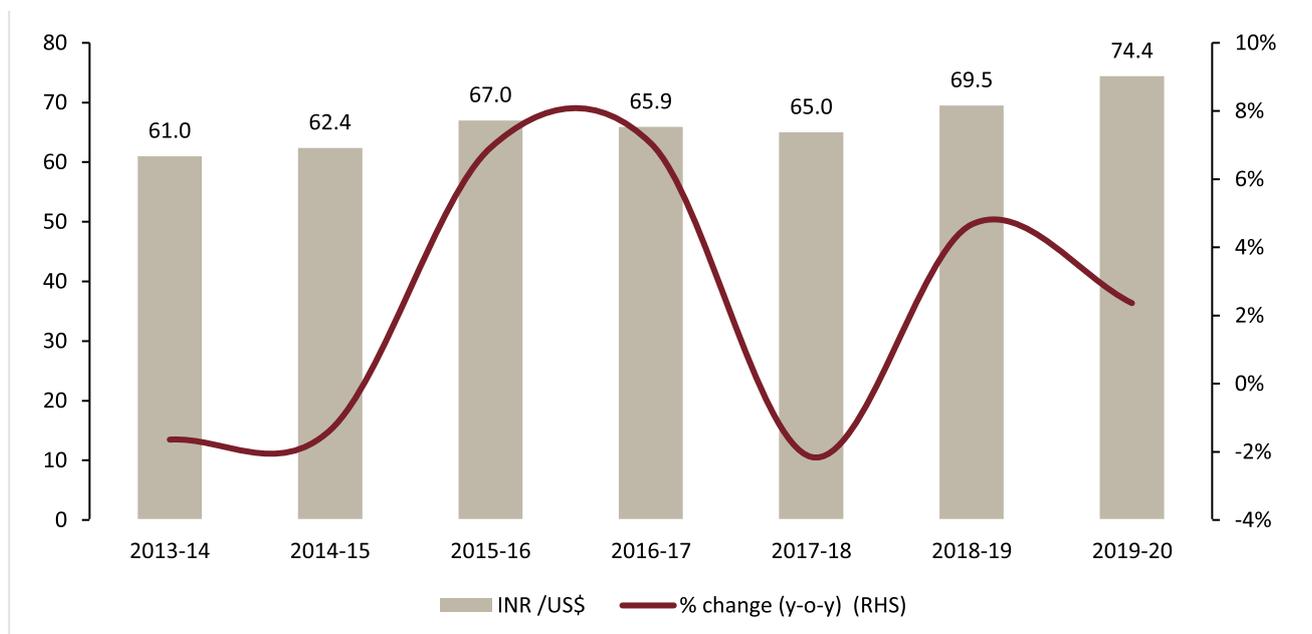
Some support should also come from capital goods production, as investment activity is likely to improve, with the rise in capacity utilisation above pre-pandemic levels. Government-led capex should also continue to lend a helping hand. Overall, broad-basing of domestic economic activity, especially with the contribution from contact-based services, would support industrial activity.

Buffeted by a strengthening dollar and widening trade deficit, the rupee to continue to slide

Merchandise trade deficit in India has consistently touched new record highs since April. The latest data shows July was no exception: the trade deficit breached \$30.0 billion, as exports contracted on-month, even as import growth remained strong. This was despite crude prices falling during the month (on a sequential basis) owing to weak global demand concerns.

The widening trade deficit is one of the key factors putting downward pressure on the rupee. It increases the demand for dollars to finance the deficit, in the face of weak capital flows so far this fiscal (particularly portfolio investment flows).

Exchange rate INR-USD



Source: RBI, CRISIL Research

The rupee continues to face downward pressure amid global growth slowdown, persisting geopolitical tensions, elevated commodity prices, and aggressive rate hikes by the Fed, which is

strengthening the dollar. That said, a similar story is playing out across most other economies as uncertain global conditions, domestic macro weakness, and a strengthening US dollar index are leading to depreciation of currencies.

In India, the rupee is also facing domestic pressure from elevated inflation and a deteriorating outlook on CAD. The CAD is expected to widen to 3% of GDP, as against 1.2% in the last fiscal. Some support for the rupee, though, can be expected from the RBI, which, in its August monetary policy meet, reiterated its commitment towards preventing large bouts of volatility in the currency.

Net-net, the rupee is expected to remain volatile in the near term. However, as oil prices soften and concerns over a hard landing due to the Fed's actions take hold, the rupee will likely average 78/\$ in March 2023, compared with 76.2/\$ in March 2022.

Review of EXIM trade

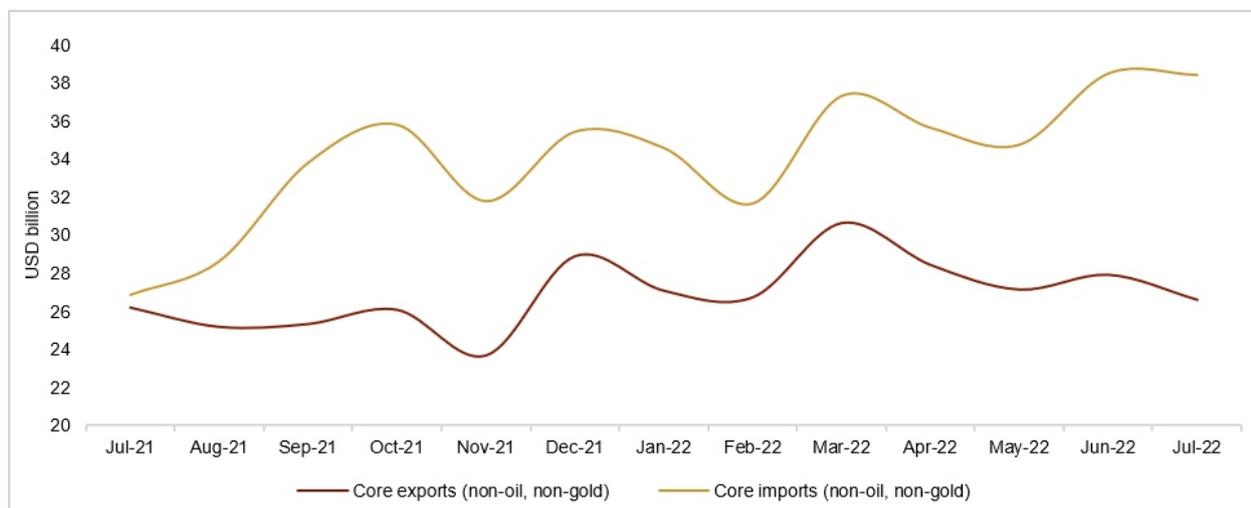
Slower petroleum, engineering and cotton yarn exports pull down overall exports

- The government imposed a windfall tax and duties on petroleum products exports at the beginning of July. While the tax was aimed at generating revenue from high crude oil price, export tariff sought to stabilise domestic stock. Petroleum products are the country's second-largest export item. That said, the taxes and duties have since been cut as international crude oil prices have climbed down
- Other major exports from the country, such as engineering goods, chemicals and pharmaceuticals, also declined during July. These items figure among the top five in India's export basket and are seemingly on a decelerating trend, given that July was the second consecutive month of decline

Crude oil, steady domestic demand for industrials prop overall imports

- Overall merchandise trade trend: Imports quickened in July even as exports slowed, leading to the record-high trade deficit. Sequentially, however, imports growth slowed to 1% from 6.7% in June
- The sequential slowdown can be primarily attributed to a 16.3% on-month decline in imports of gold, India's third-largest import item. The increase in import duty on gold to 12.5% (from 7.5%), announced in July, also had a dampening effect
- At 4% on-month, the growth in crude oil imports was steady (vs 1.7% in June)

Gap between core exports and imports widening



Source: Ministry of Commerce and Industry, CRISIL Research

The sharp widening of merchandise trade deficit in July has set off alarm bells as outlook for the country's CAD has weakened because of multiple headwinds to global growth that are likely to pull down exports. The US and Europe are already seeing signs of a slowdown with their GDP growth remaining weak in the first half of the current calendar year.

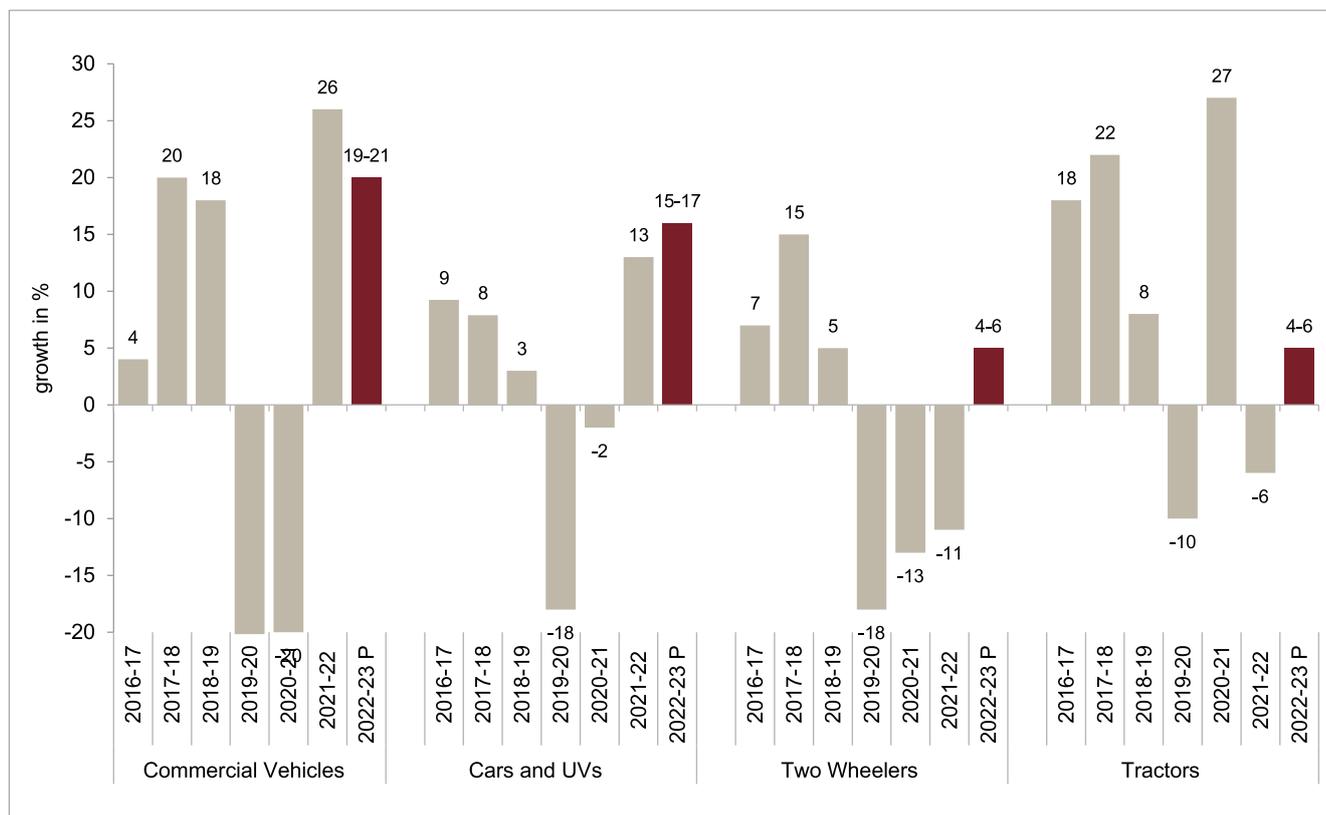
Also, a depreciating rupee may not support India's overall exports much, as they are more responsive to trends in global growth. A decline in commodity prices from their record highs will cushion the sequential momentum in import bill, but it is unlikely to have a significant impact on the overall deficit figure as prices still remain elevated from the year-ago period.

That said, the July deficit number seems more of a blip caused by contraction in petroleum exports – which will correct as the taxes/duties on them are eased.

Net-net, we see the import bill ballooning even as exports slow down, leading to a wider CAD. Some support is expected from the rebalancing of trade from merchandise to services, which will boost services exports. But this will not meaningfully alter the overall trade balance. We, thus, expect India's CAD at 3.0% of GDP this fiscal, as against 1.2% in the last.

Automobile industry

Sales projections for various automobile segments



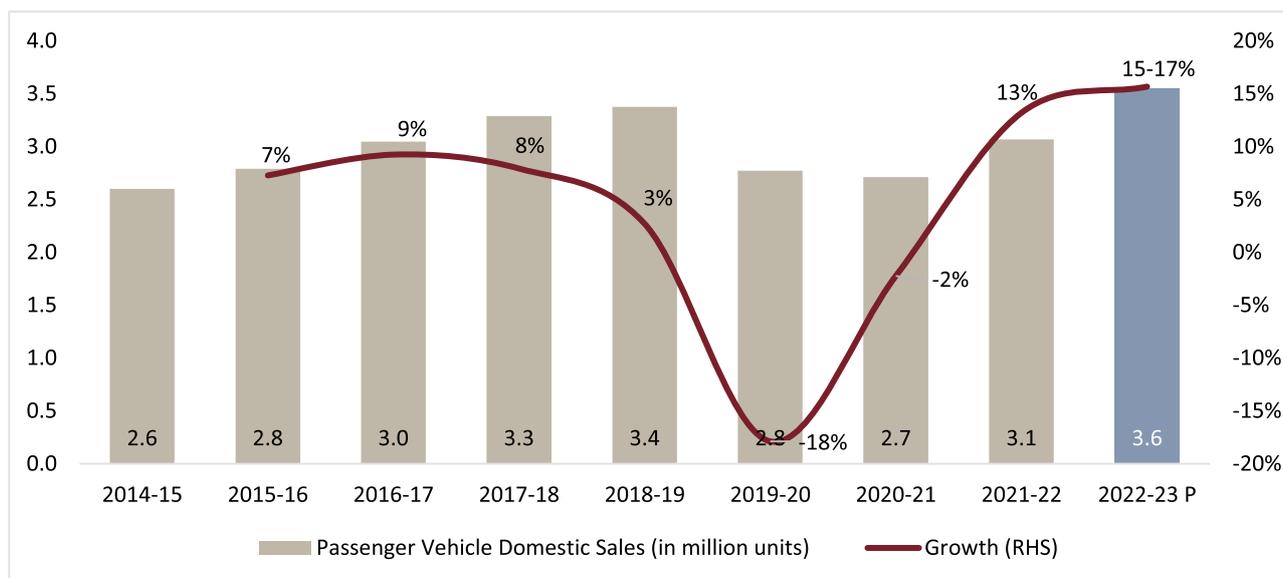
Source: SIAM, TMA, CRISIL Research

All automobile segments are expected to see growth on account of improvement in economic activities. Except tractors, all segments have witnessed growth on a low base of previous years due to the economic disruption caused by the pandemic.

- Urban income is estimated to have recovered post the first quarter of fiscal 2023, in line with recovery in demand, while rural India brought its share of good tidings, with record-high production and an expected 3-5% increase in food-grain production, as well as healthy reservoir levels, to support sowing in fiscal 2023
- Rural contribution to be on par with last year, with an expectation of a normal and well-distributed monsoon in fiscal 2023
- Infrastructure activities to uplift automobile demand in the current fiscal with higher contribution in the second half
- Crude oil prices to average \$108-113 per barrel in fiscal 2023. Hence, retail fuel prices to remain elevated, thus impacting vehicle demand
- Elevated inflation to impact consumer disposable income in the short term
- Rising commodity prices to remain a key monitorable for all vehicle segments.

Passenger vehicles

Healthy buying sentiment due to pent-up demand, supported by improving supply conditions, to increase volumes by 15-17% this fiscal



Source: SIAM, CRISIL Research

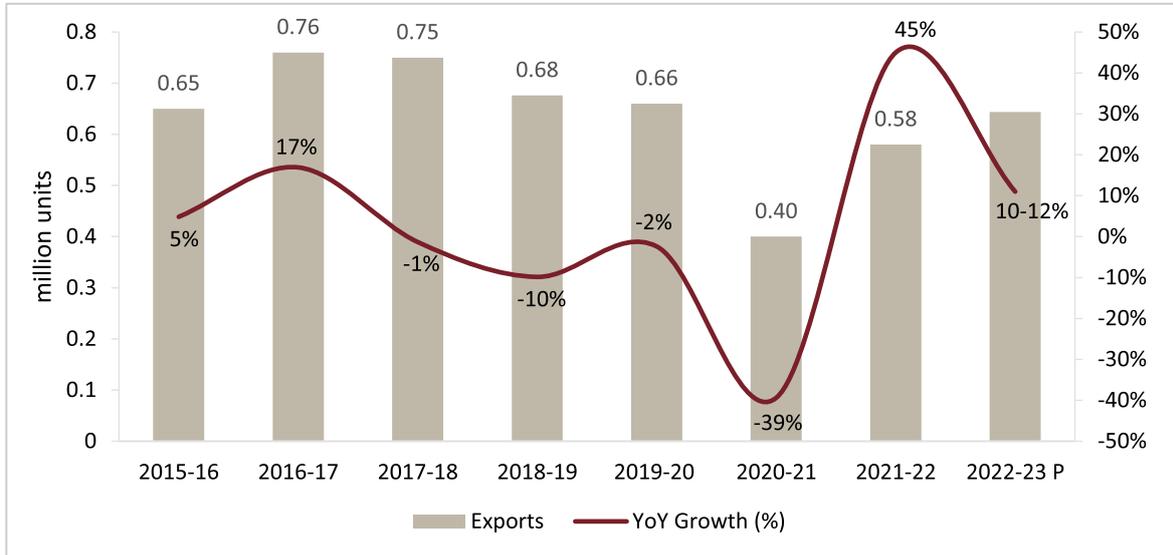
- A faster-than-anticipated recovery in order levels of the auto sector in the latter half of fiscal 2021 led to a chronic shortage of semiconductors as manufacturers were unable to cater to the rebounded auto sector demand, along with increased demand from the consumer electronics market during Covid-19
- All this had a cascading impact on the supply chain of many original equipment manufacturers (OEMs) operating in India and globally. Accordingly, the wholesale volumes witnessed a modest ~2% on-quarter recovery in the second quarter on a low base and fell ~15% on-year in third quarter of fiscal 2022
- The overall wholesale volumes settled at ~3.07 million units in fiscal 2022, with on-year growth of ~13%. We expect semiconductor shortage to continue till the end of fiscal 2023, with a gradual improvement over the year
- The share of small cars in the overall industry shrunk to 39% in fiscal 2022 from 56% in fiscal 2021 due to the launch of multiple compact UVs in the price bracket of premium hatchbacks, leading to a higher preference for the more profitable UV segment, coupled with OEMs prioritising chips for UVs over small cars
- **A modest rise in total cost of acquisition after fiscal 2022:** Around 5% price hike taken by OEMs in fiscal 2022 led to an increase in total cost of ownership (TCO) by 3-5%. A further expected price hike of 2-4% and increase in third-party insurance premium would increase

TCO by a further 3-5% in fiscal 2023. We expect TCO to grow a modest 1-3% in fiscal 2024 amid stable registration and insurance.

- **Financing favourable for cars and UVs:** With an increase in vehicle prices, and marginal improvements in the loan-to-value (LTV) ratio and finance penetration, disbursements in the personal vehicle segment recovered 23% in fiscal 2022 from a decline of 4% in fiscal 2021. A similar trajectory is expected in fiscal 2023, leading to a ~17% increase in disbursements. Higher interest rate reduction aided passenger vehicles sales, coupled with a lower share of non-captive non-bank financial companies (NBFCs)
- **Traction of new models to sustain in fiscal 2023:** Contribution to sales from new models reduced to 9% in the first quarter of fiscal 2023 due to fewer launches. Going ahead, multiple launches of anticipated models in this segment are expected to bode well for the industry. Newer model launches are expected to boost growth in fiscal 2023, taking overall volumes up by 15-17%

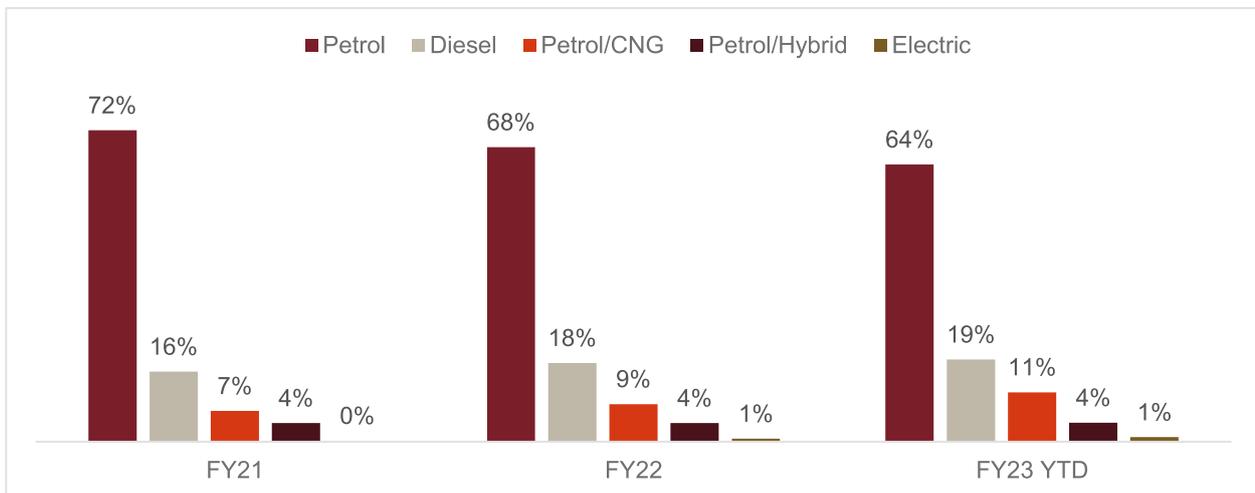
After witnessing optical growth of ~43% last fiscal, exports to grow 10-12% on year this fiscal

- In fiscal 2022, exports are estimated to have increased ~43% on-year on a low base. Maruti Suzuki led with exports of over 1.4 lakh vehicles, exceeding its exports in fiscals 2021, 2020 and 2019
- Latin America and Africa dominated the demand for Maruti Suzuki's Baleno, S-Presso and Dzire models. Hyundai, which exported ~1.3 lakh vehicles, followed close behind, with export growth of ~148%, led by Creta and Verna models
- Following a ~39% on-year drop in fiscal 2021, exports improved drastically by ~43% in fiscal 2022. Exports are projected to recover in fiscals 2023 and 2024 at an estimated 10-12% and 7-9% on-year, respectively
- Exports to South Africa increased to 19% in fiscal 2022 from 9% in pandemic-hit fiscal 2021. South Africa has become the major export market, with a growth rate of 114%, surpassing Mexico due to higher demand for entry-level vehicles. Newer markets such as Saudi Arabia and the US have also seen some increase.



Source: SIAM, CRISIL Research

Expanding compressed natural gas (CNG) presence in India



Source: Industry, MoRTH, CRISIL Research

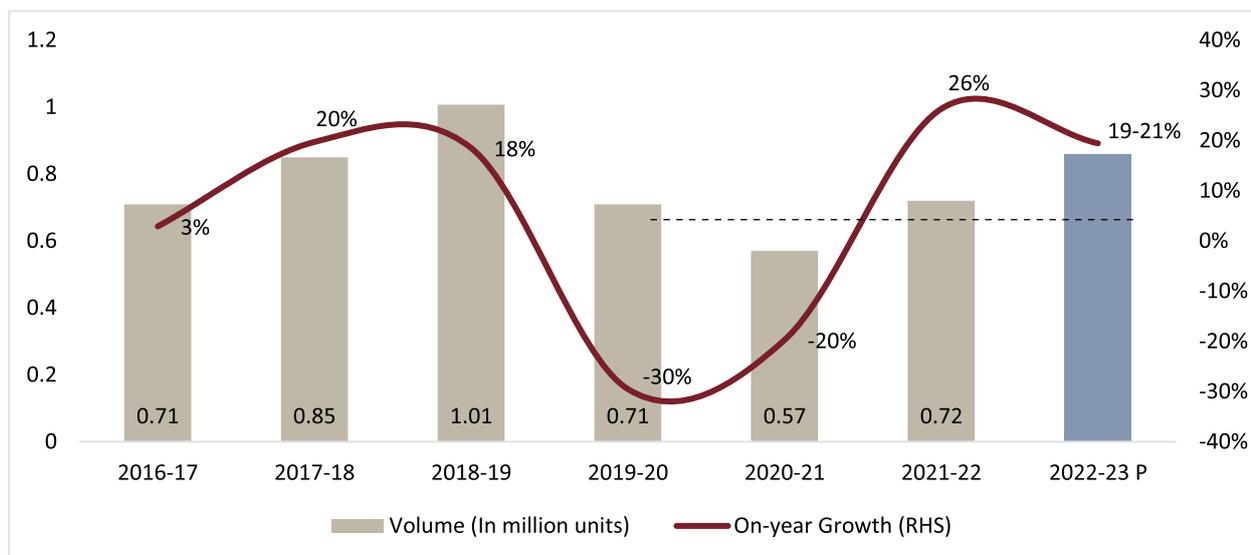
With fuel prices rising in India, the number of CNG vehicles has been increasing as well. CNG has largely substituted diesel in the compact car space and has turned into not only a cost-effective alternative, but also a cleaner option for the environment.

However, the rise of sales of CNG vehicles has been declining on the back of a 50-60% increase in gas prices over the past 12 months. The prices of CNG increased to Rs 75-86 per kg in metros at the beginning of August 2022, compared with below Rs 50/kg a year ago. Experts believe these

are unprecedented times where all commodity prices have seen a significant increase; but in the long run, the price gap between liquid fuels and CNG will remain

Commercial vehicles

Volumes in this fiscal to be aided by materialisation of deferred replacement demand and pre-buying



Source: SIAM, CRISIL Research

- **Low base impact to lead to high growth in the first quarter of this fiscal:** Wholesale offtake of light commercial vehicles (LCVs), medium and heavy commercial vehicles (MHCVs) and buses increased 90%, 142% and 258% on-year, respectively, in the first quarter of this fiscal owing to the low base of the previous fiscal due to impact of the second wave as economic activity across segments recovered
- **Increasing freight rates to aid in materialisation of deferred demand:** Fuel prices account for ~50% of transporter costs and have a significant bearing on their profitability. In the first quarter of fiscal 2022, diesel prices increased ~6% q-o-q but freight rates declined ~13% q-o-q due to Covid-19 resurgence negatively impacting transporter profitability. Compared with the first quarter of fiscal 2022, freight rates have increased ~2% in the fourth quarter of the fiscal while diesel prices have decreased ~2% in the period. This indicates swifter recovery, which has supported CV demand to some extent.

In the first quarter of this fiscal, freight rates have increased 30% on-year compared with an only 12% increase in diesel prices, indicating improving transporter profitability and higher freight demand, which is expected to aid CV sales volumes.

- **Demand expected to improve in this fiscal and the next, supporting transporter sentiments:** Freight utilisation fell in fiscal 2020 since freight-carrying capacity rose greater than freight demand owing to the axle norm. In fiscal 2021, freight carrying-

capacity remained high, but freight demand fell owing to fall in economic activity. This further lowered fleet utilisation. In fiscal 2022, sequential recovery in the economy boosted freight demand. Going ahead, fleet utilisation in this fiscal and the next would recover, resulting in higher MHCV demand.

- **MHCV and LCV volumes in this fiscal to be supported by materialisation of deferred replacement demand:** Transporter utilisation and transporter profitability had been severely hit during the pandemic. Small fleet operators registered negative margins in fiscal 2021 with freight rates had not increasing commensurately with higher fuel prices. Accordingly, vehicle sales were hit significantly since fleet owners could not replace their fleet as per the regular cycle.

As per our interactions with stakeholders across the value chain, replacement accounted for ~80% of annual sales in the past three fiscals amid low fleet utilisation and weak profitability. However, if we compare with the volumes up for replacement considering a 5-6 year replacement cycle, the replaced volumes are still on the lower side. Though fleet utilisation has been improving, profitability is still to recover to fiscal 2018 levels.

Similar is the situation in the LCV segment. Replaced volumes are assumed to account for ~50% of annual sales in this segment, since robust demand from e-commerce and consumption activities have helped new entrants. These have been lower than the actual volumes up for replacement considering a 7-8 year replacement cycle and, as such, have accumulated

- **Bus sales to recover over a low base in this fiscal due to relaxation of mobility restrictions:** In fiscal 2021, the pandemic impacted bus demand due to mobility restrictions. State transport undertakings (STUs) had driven demand in fiscal 2020 with the purchase of a large number of Bharat Stage (BS)-IV vehicles. Hence, volumes in fiscal 2022 witnessed an optical growth of ~64% on-year. In fiscal 2023, bus demand is expected to continue to show robust growth with schools opening, offices resuming, tourism picking up, and relaxation of travel restrictions. Further, volumes could improve in the current fiscal aided by proposed mandatory scrapping of government-owned vehicles, largely those belonging to STUs.

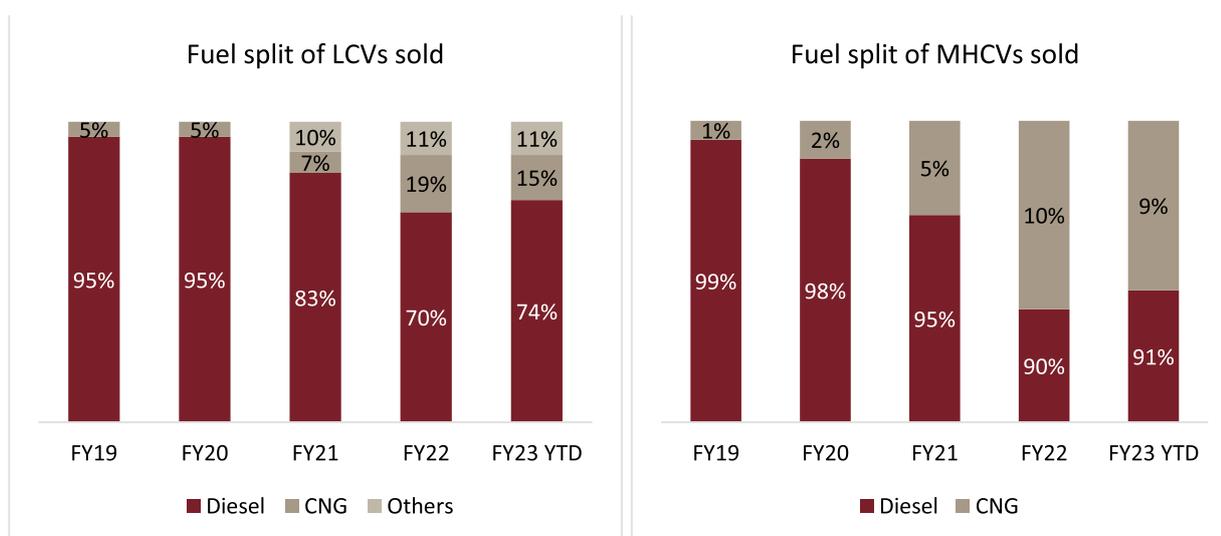
Growth expected across end-use segments

Segments	FY18	FY19	FY20	FY21	FY22	FY23 P
Coal (Production)	2.0	7	0	(4)	11	6-8
Iron ore (Production)	3	3	19	(17)	23	1-3
Steel (Consumption)	8	9	2	(5)	13	6-8
Cement (Consumption)	9	12	(2.4)	0.3	8	7-8
NHAI roads (Km constructed / Day)	8	9	11	11	13	14-15
Port (Traffic)	6.5	8.2	2	(5.5)	4.4	4-6

Note: Values are % growth on-year

Source: CSO, RBI, SIAM, CRISIL Research

Shift in fuel types of CVs to CNG



Note: YTD - till July 2022

Source: MoRTH, CRISIL Research

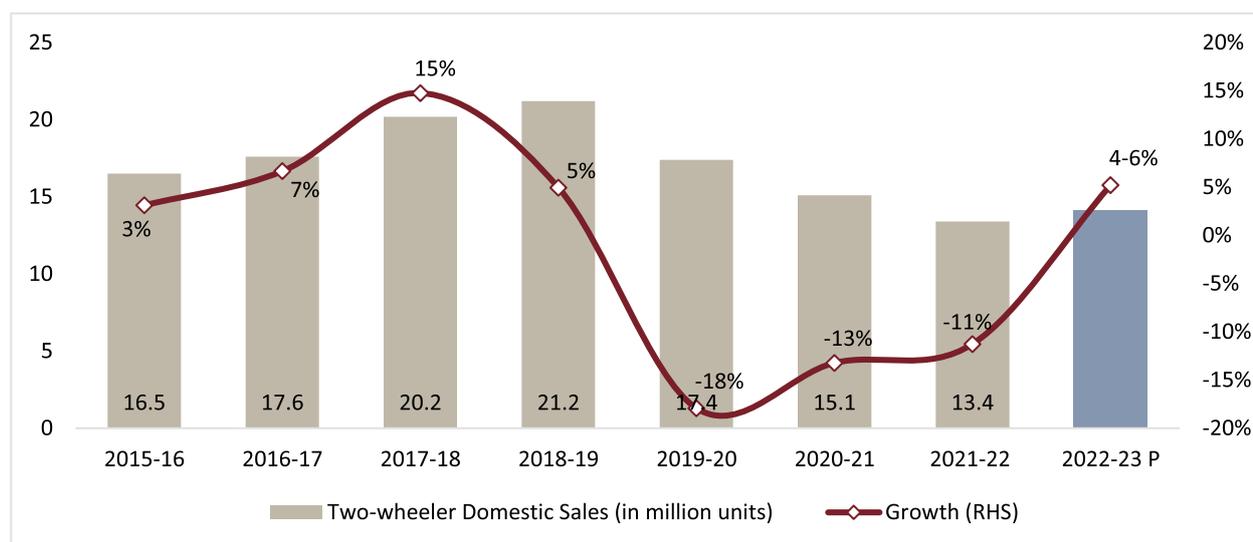
CNG prices have increased 50% relative to a 5% increase in diesel prices, leading to narrowing of their price gap so far this fiscal as compared with the average prices in fiscal 2022. Demand has taken a hit, with the share of CNG MHCV vehicles sold in July 2022 dipping to ~6% of total sales compared with 10% for entire fiscal 2022.

The higher cost of diesel as well as significant increase in the price of diesel variants post BS-VI transition has impacted its sales. Also, availability of petrol and CNG variants at a much lower price and better economics as well as low freight load availability has driven adoption. CNG adoption is more prominent in the sub-one tonne and ICV segments while petrol adoption is visible only in the sub-one tonne segment.

A key reason for slower penetration of CNG vehicles in the past was the limited city gas distribution network connectivity. In fact, if we look between fiscals 2016 and 2020, the number of CNG stations increased by a mere 1000 new stations. However, fiscals 2021 and 2022 saw an incremental ~1,000 new stations, respectively, taking the total number of CNG stations to ~4,400 in March 2022. The total number of stations is set to reach 10,600 by fiscal 2025.

Two-wheelers

Two-wheeler sales to recover in this fiscal



P: Projected

Source: SIAM, CRISIL Research

- Post consecutive years of decline in wholesale domestic volumes since fiscal 2020, internal combustion engine two-wheeler domestic volumes are projected to improve ~4-6% this fiscal. There is an upside to the forecast if the discounts offered during the festive season are higher than normal coupled with manufacturers increasing inventory more than anticipated to ply with BS-VI B regulations.
- **Volumes will recover:** Volumes are expected to be driven by recovery in scooter sales as educational institutions and offices re-open, more people commute to office, and urban income sentiment improves. Normal monsoons prediction will likely support demand for motorcycles segment
- **But volumes will be lower than fiscal 2019:** However, volumes in this fiscal are expected to be ~28% lower than the peaks of fiscal 2019 since the significant price hike in this segment over the past few fiscals has dampened consumer sentiment. The asset price is estimated to have increased ~10-15% since fiscal 2019 owing to safety norms, BS-VI implementation and higher input costs
- **Cost of ownership to further increase in the current fiscal:** In fiscal 2023, CRISIL Research expects total cost of ownership (TCO) to increase 6-8% on account of the higher vehicle price hike, interest rates hike, and fuels costs. However, rising fuel prices remains a key monitorable. Further, cost of acquisition is also expected to rise 3-5% on-year in this fiscal

post the 8-10% increase in fiscal 2022. Cost of acquisition increased in fiscal 2022 due to lower LTVs and ~10-15% higher vehicle cost

- **Rural demand remains under pressure:** Farm family income is expected to decline 2-3% this fiscal largely owing to lower cultivation income. Non-farm income, too, is expected to decline marginally. Overall, we expect rural income to be under pressure in the fiscal. Motorcycles witnessed a demand pressure in fiscal 2022 since rural income contributes to their sales. However, motorcycles demand is expected to remain restricted in fiscal 2023
- **LTVs to improve in-line with demand recovery:** In fiscal 2022, retail sales of two-wheelers improved 6% on year on a lower base of the previous year. Going ahead, we expect lending in the two-wheeler space to be better on account of addition of support from various captive non-banking finance companies (NBFCs) that are aggressively trying to capture market in the rural space, thus helping sales.

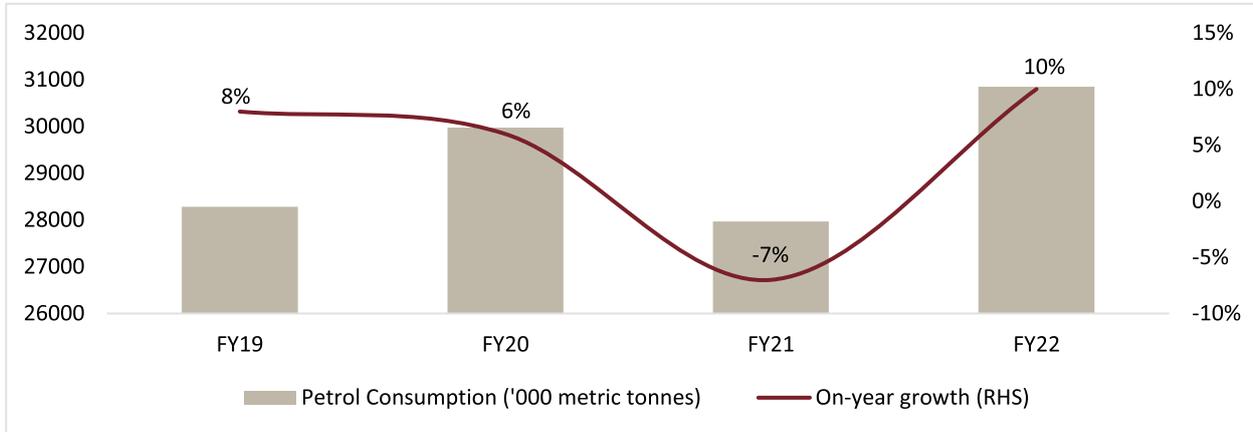
Gradual improvement expected in two-wheeler industry

Parameters	Impact		
	FY21	FY22	FY23 P
Income for discretionary spending	NF	NF	F
Cost of ownership	NF	NF	NF
Financing	N	N	N
Inventory	N	NF	N
Model launches	N	F	F
Regulations	NF	N	N
Impact on overall sales growth	NF	NF	N

Source: CRISIL Research

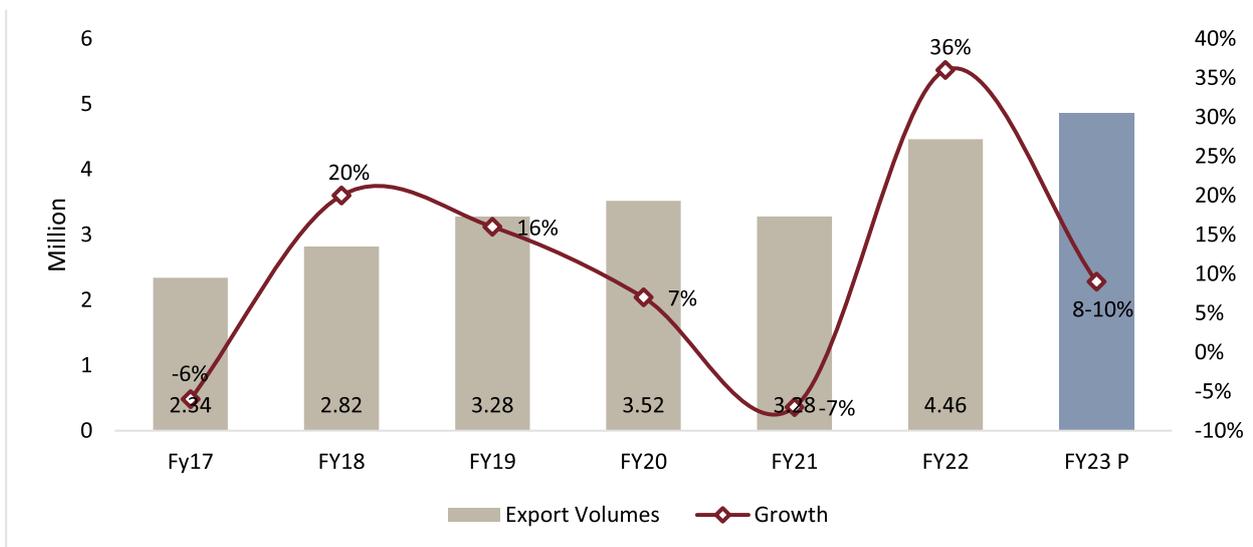
Improving petrol consumption indicates recovery in personal mobility

We expect urban demand sentiment to improve in this fiscal in line with reopening of offices and educational institutions. This is expected to support scooter sales.



Source: CRISIL Research

Two-wheeler exports to pick up further in this fiscal



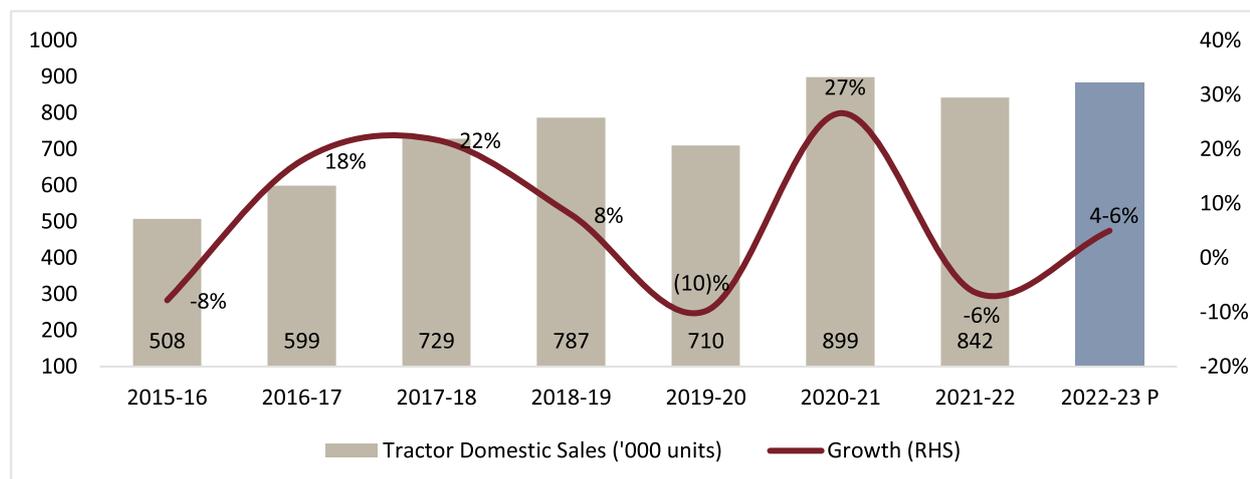
P: Projected

Source: SIAM, CRISIL Research

Demand for scooters increased 51% on-year in fiscal 2022 on a very low base of the previous fiscal. HMSI and TVS's key export market for scooters includes Sri Lanka and Nepal. In fiscal 2022, Bajaj Auto lost market share by 5%. Nonetheless, CRISIL Research expects scooters will continue to gain market share over the near to medium term due to a wider product portfolio.

Tractors

Domestic tractor industry to bounce back this fiscal after declining in fiscal 2022



P: Projected

Source: TMA, CRISIL Research

- Domestic tractor demand dropped 6.4% on-year in fiscal 2022 after registering a 27% growth in fiscal 2021. Rising tractor prices amid price hikes taken by OEMs, higher inventory at the dealer's end, lower commercial demand, negative farmer sentiment due to rising cost of cultivation, low fertiliser availability, and increase in other expenditure (such as marriages and other social occasions) hampered demand
- Domestic tractor demand is expected to clock 4-6% on-year growth in fiscal 2023 after declining 6.4% on-year in fiscal 2022. Higher commodity prices and normal monsoon prediction would support demand. Healthy demand is expected in the first half of this fiscal, which will lead to higher sales growth; slower growth in the second half would limit growth for the fiscal. However, lower replacement demand and higher inventory levels will likely prevent further growth
- Commercial demand for tractors accounts for 18-23% of overall tractor demand. Apart from their primary application in agriculture operations, tractors are also used to haul bricks, sand and farm produce. Pick-up in commercial activity in the second half of the fiscal in Bihar, Orissa and Uttar Pradesh will lead to an increase in the share of commercial demand in this fiscal
- The uneven spread of monsoon in the current fiscal has hampered kharif sowing in certain regions. However, overall, the monsoon is expected to be normal as per India Meteorological Department for the current fiscal; hence, the crop production is expected to be favourable

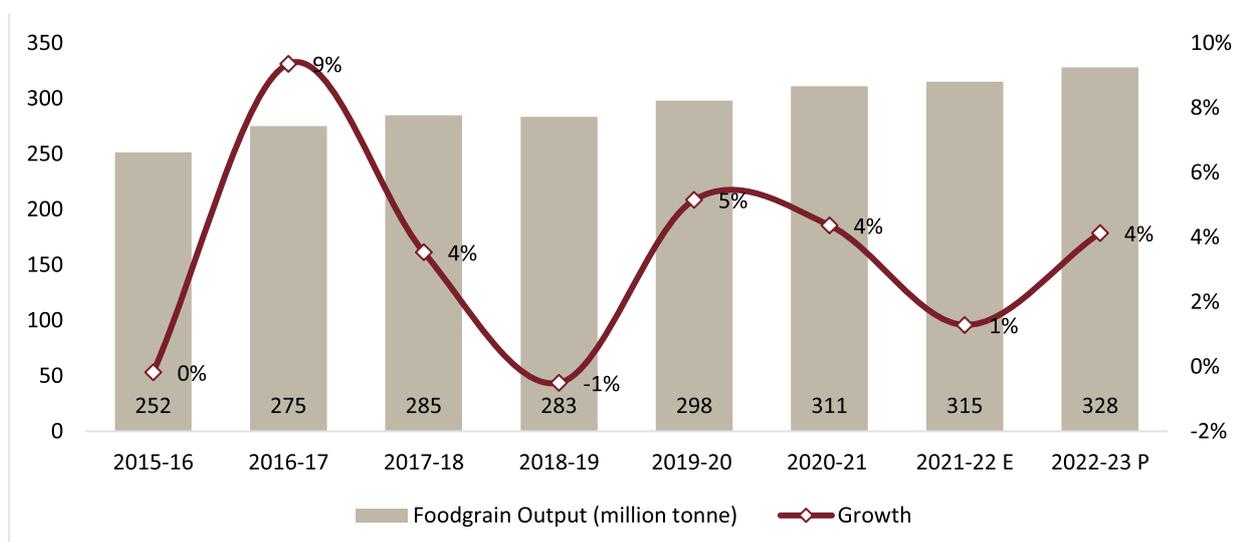
- Increase in minimum support prices have led to some positivity on the ground with respect to farm income. However, income levels are expected to be impacted if the overall output is hampered due to the uneven spread of rainfall

Improving farm income and pick-up in commercial activities to drive domestic tractor demand

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

Source: CRISIL Research

Foodgrain target expected to be higher on-year for fiscal 2023

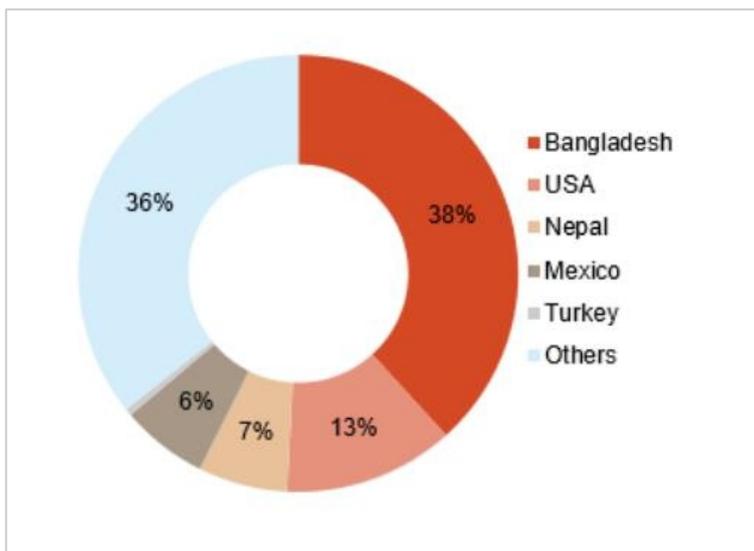


E: Estimated, P: Projected

Source: Ministry of Agriculture, CRISIL Research

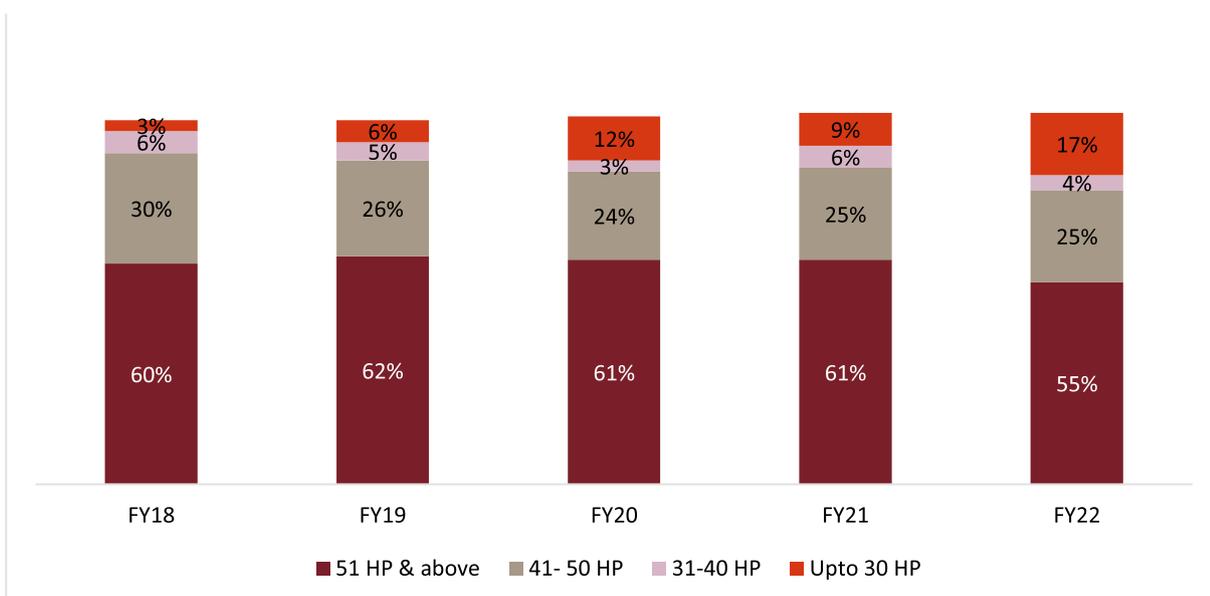
The government has set the foodgrain production target at a record level of 328 million tonne for the 2022-23 crop year on the back of a good monsoon. The target is 3.8% higher compared with the previous year's output.

Export demand for tractors remained healthy through fiscal 2022



Source: Ministry of Commerce, CRISIL Research, FY22

Tractors <30HP on an uptrend in exports



Source: TMA, CRISIL Research

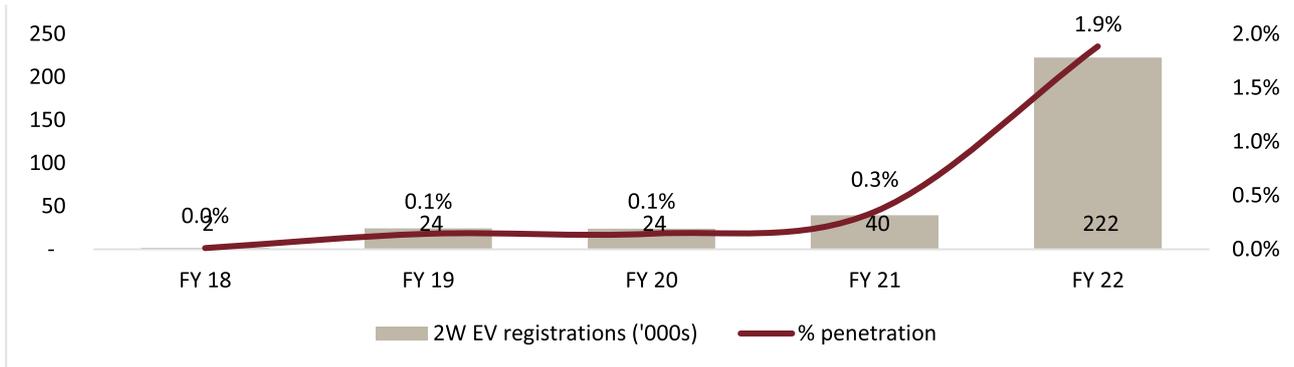
Tractor exports to grow in fiscal 2023

- Exports, accounting for ~13% of overall tractor sales, are expected to rise 7-9% on-year in this fiscal. Demand for India tractors has been high in Bangladesh, the United States, Mexico, and European countries. In fiscal 2022, exports rose 45% on-year after registering a 17% on-year growth in fiscal 2021
- Favourable diplomatic ties with Bangladesh and logistical ease between both countries has led to rise in exports to the nation. A strategic push, such as setting up bases in foreign countries, by players to cater to global demand is also expected to push export sales
- Tractor exports are expected to grow at 4-6% compound annual growth rate between fiscals 2022 and 2027. The United States, Europe and Asia are likely to remain the focal regions for long-term exports
- Also, with India emerging as an export hub for relatively small tractors (30-75 horsepower or 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.

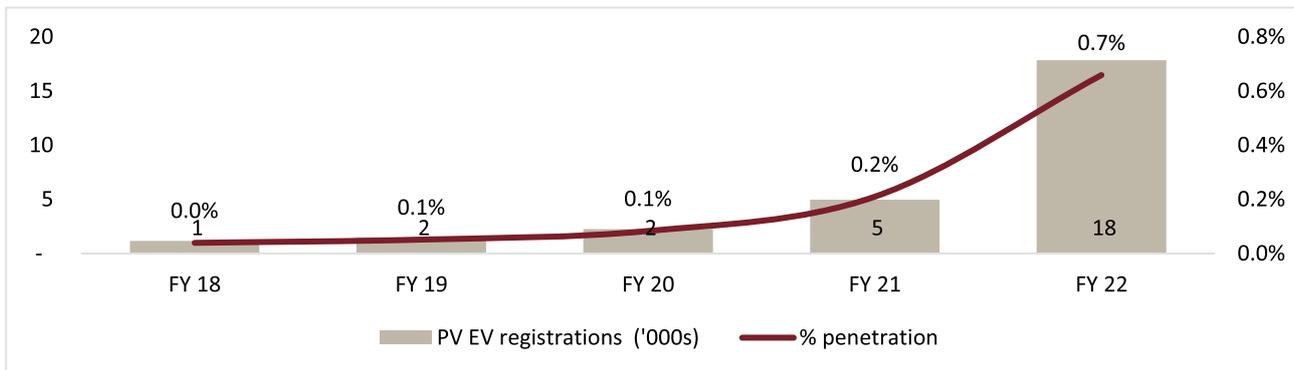
Electric Vehicles

Overview of the electric vehicle (EV) market in India

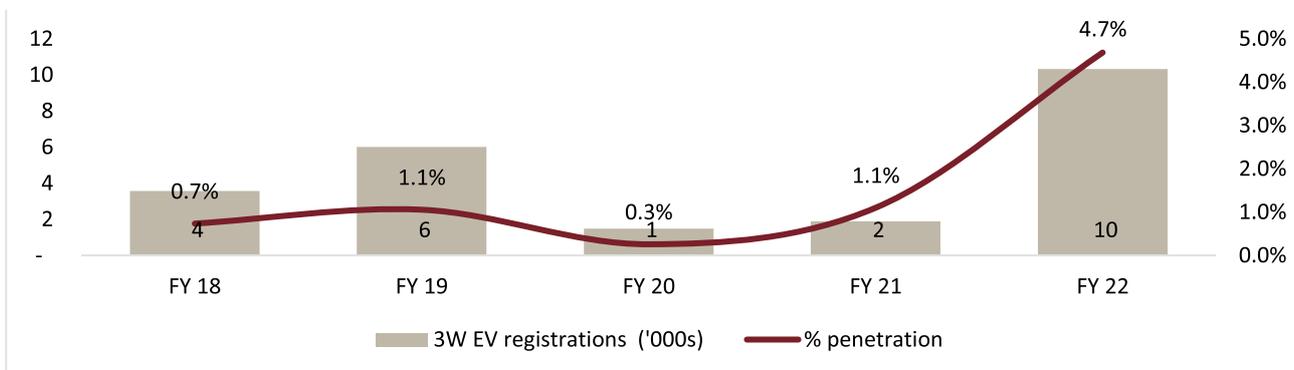
Two-wheeler:



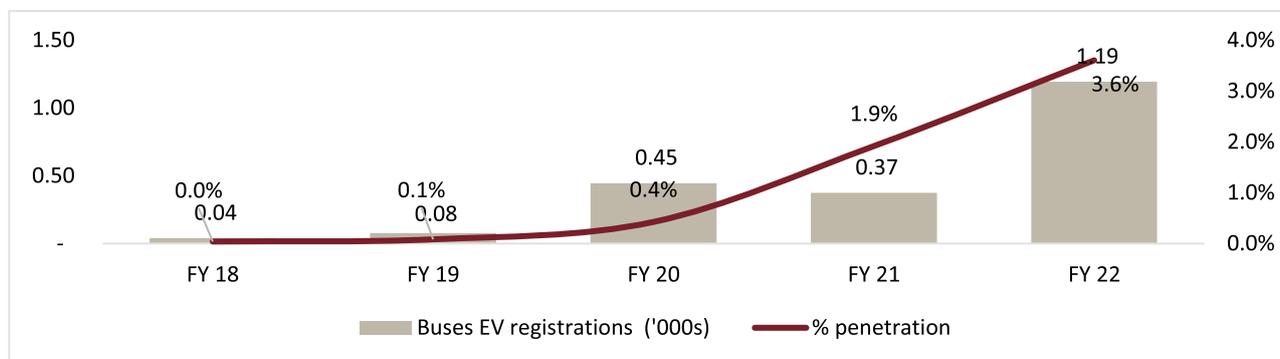
Passenger Vehicle:



Three-wheeler:



Buses:



Note:

1. Figures exclude Andhra Pradesh, Telangana and Madhya Pradesh, which contribute about 17%,19% and 12% in terms of 2W,3W and PV sales, respectively
2. Registrations include figures only for high-speed vehicles (>25 kmph)
3. Three wheelers do not include e-rickshaws

Source: MoRTH, CRISIL Research

The **electric vehicle industry in India** is growing at a rapid pace. The central and state governments have launched schemes and incentives to promote electric mobility in the country and many regulations and standards are also in place.

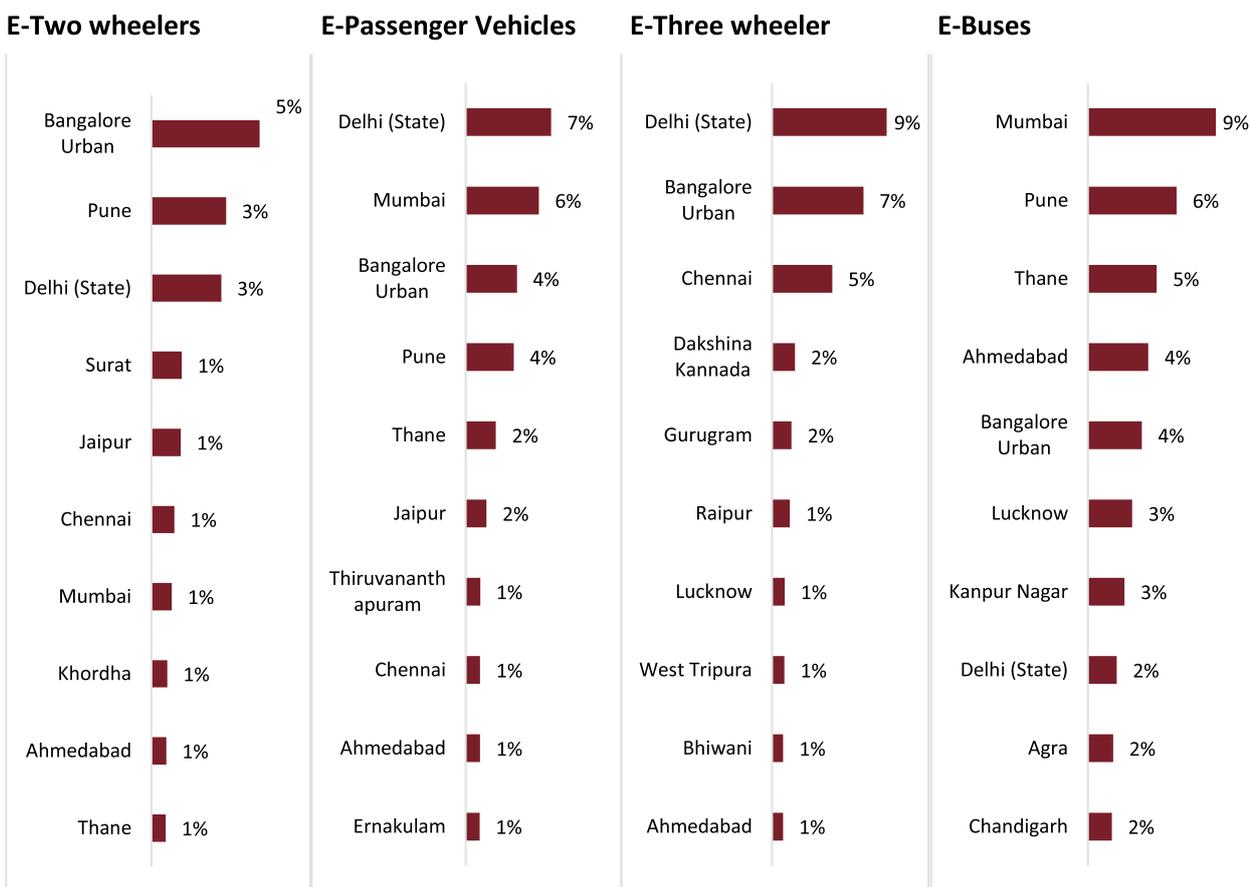
The government has announced Rs 100 billion for Phase 2 of Faster Adoption and Manufacturing of Hybrid and Electric Vehicles (FAME) which has commenced in 1st April 2019. The policy aims to provide a subsidy of Rs 10,000 per KWh to four wheelers (BEV (battery electric vehicle), PHEV, strong hybrid) for commercial purpose and public transport. It envisions creation of infrastructure for charging of EVs while the same for 2 wheelers is Rs 15,000 per KWh.

Current EV penetration in passenger vehicle category is miniscule (0.7% as on fiscal 2022) due to unavailability of affordable electric cars and charging stations leading to range anxiety. However, fiscal 2022 saw robust sales of e-Nexon.

Currently, most of the EVs used in the commercial segment as goods carriers 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 last mile logistics and local distribution of goods are well suited applications for EVs.

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. Under the FAME-II incentive, the government will provide subsidy amounting to Rs. 20,000 per kWh of battery used in an electric bus and a maximum of Rs. 50,00,000 per bus for 7,090 buses. 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. Recently CESL has also laid out a commitment of tendering 50,000 electric buses over the next couple of years of which 5,040 buses have already been tendered.

Top 10 districts in terms of EV registrations: FY22



Top 10 districts account for about **15-20% of E-2W** registrations in India in FY22 as compared to **40-45%** in India in FY21

Top 10 districts account for about **25-30% of PV** registrations in India in FY22 as compared to **55-60%** in India in FY21

Top 10 districts account for about **25-30% of High speed 3W** registrations in India in FY22 as compared to **55-60%** in FY21

Top 10 districts account for about **40% of Bus** registrations in India in FY22 as compared to **>95%** all bus registrations in FY21

Note: Figures for FY 21 and FY 22 are estimated as per MoRTH’s Vaahan portal. Figures exclude Andhra Pradesh, Telangana and Madhya Pradesh,

Three wheelers do not include e-rickshaws

Source: MoRTH, CRISIL Research

Outlook for Electric Vehicles in India

Two-Wheelers:

CRISIL Research expects 1 in every 2 two wheelers to be sold as EV by fiscal 2030. Penetration in fiscal 2022 was ~2%. Electric vehicle adoption in the two-wheeler segment will be largely driven by urban scooter buyers. This is since cost of ownership in case of electric scooters is expected to be less than that for internal combustion engine scooters. Major OEMs are already in the process of developing electric vehicles in-house or acquiring stakes in existing electric vehicle start-ups in order to diversify their offerings.

Passenger Vehicle:

CRISIL Research expects 1 out of every 4 passenger vehicles sold in India to be electric by fiscal 2030. Penetration in fiscal 2022 was ~1%. EV penetration can be higher if 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 will also be propelled by policies adopted by the government for penalising non-adherence to CAFÉ norms.

Three-wheeler:

CRISIL Research expects penetration of EVs in three-wheeler segment to be ~60% in fiscal 2030. Penetration in fiscal 2022 was ~5%. Three-wheelers will spearhead the Indian EV journey because these vehicles have to travel fewer distances, carry more load and generally will make do with a day's worth of charge. In addition to the cost advantage due to central and state subsidies on EVs, total cost of ownership of an electric three-wheeler is much lesser when compared to ICE alternatives.

Buses:

CRISIL Research expects 1 in every 5 buses sold in fiscal 2030 to be electric largely driven by State Transport Undertakings (STUs). Penetration in fiscal 2022 was ~4%. Operational profiles of buses with fixed routes and regular stops make them suitable for charging at pre-determined intervals and specific locations. With other incentives from the central and state governments, the sales of electric buses are expected to pick up in the long term.

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Incentives And Schemes to Strengthen the Automobile Sector

by



EY

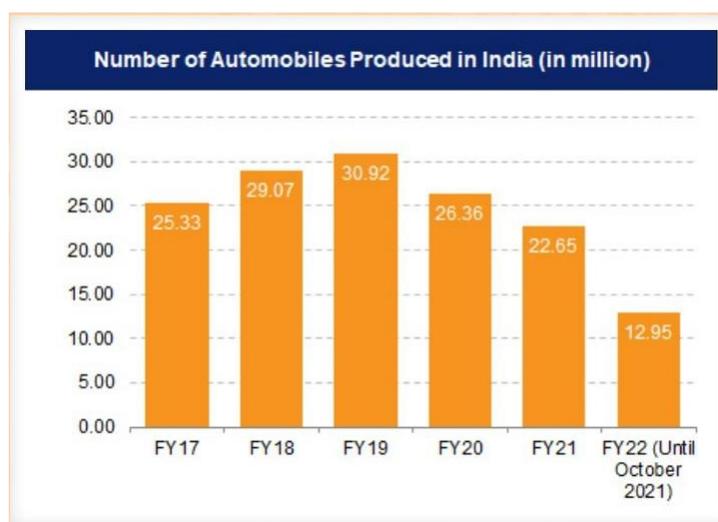
Building a better
working world

Incentives and Schemes to strengthen the Automobile Sector

1. Introduction

India's Automotive Industry is a significant pillar of the economy since it is worth more than \$222 bn and contributes 8% of the country's total export and accounts for 7.1% of India's GDP and is set to become the 3rd largest in the world by 2030

We are already a pioneer in the international heavy vehicles arena and is the largest tractor manufacturer, second-largest bus manufacturer, and third largest heavy trucks manufacturer in the world.



Automobile Industry report by "India Brand Equity Foundation"

The dawn of FY 2023 is going to witness another milestone of the Indian automotive industry, which is expected to grow to 16%.¹

It is also to be noted that the electric vehicle (EV) market in India is estimated to reach Rs. 50,000 Cr. (US\$ 7.09 billion) by 2025.

Further, according to NITI Aayog and the Rocky Mountain Institute (RMI), India's EV finance industry is likely to reach Rs. 3.7 lakh crore (US\$ 50 billion) by 2030.

Not only this, but a report by the India Energy Storage Alliance estimated that the EV market in India is likely to increase at a CAGR of 36% until 2026. Additionally, the projection for the EV battery market is also expected to expand at a CAGR of 30% during the same period.

Therefore, it becomes significantly important for the economy as a whole, along with all the relevant stakeholders, to give due credits to the Indian Automobile Sector to take it to greater heights.

2. Initiatives by Government and other stakeholders regarding e-mobility

- ▶ In the wake of the aforementioned numbers, India has committed to reach a 30 percent sales share for EVs by 2030. This presents a cumulative investment opportunity of as large as INR 19.7 lakh crore (\$US266 billion).
- ▶ Additionally, there has also been a significant increase in the recent public budgetary allocations and corporate investment in EVs in order to achieve this. Both central as well as state governments have approved fiscal incentives for EVs, charging infrastructure, and manufacturing that are helping to achieve parity in total cost of ownership with internal combustion engine (ICE) vehicles for several segments and use cases.

Captured hereunder is a summary of the Key capital commitment and deployment for electric mobility in India between January and December 2021 (As quoted in the report by NITI Aayog, RMI, and

¹ Automobile Sector Report by National Investment Promotion & facilitation Agency
RMI India, Banking on Electric Vehicles in India: A Blueprint for Inclusion of EVs in Priority Sector Lending Guidelines, January 2022)

Stake Holders	Initiatives
Department of Heavy Industry (DHI), Government of India	<ul style="list-style-type: none"> Revision of Faster Adoption and Manufacturing of Electric Vehicles Phase II (FAME II) demand incentives for electric 2-wheelers (e-2W) from INR 10,000 per kWh to INR 15,000 per kWh. Incentive cap increased from 20 % to 40 % of the capital cost of the e-2W. Energy Efficiency Services Limited (EESL) will be responsible for aggregating and leasing 3 lakh electric 3-wheelers (e-3W) as well as electric buses (e-buses) available under FAME II.
Government of India	<ul style="list-style-type: none"> Production-Linked Incentive (PLI) scheme approved for investments in <ul style="list-style-type: none"> advanced chemistry cell (ACC) battery manufacturing; and worth INR 25,938 crores approved for automotive manufacturing focusing on EVs and hydrogen fuel cell vehicles.
State governments	<ul style="list-style-type: none"> State EV policies of Assam, Goa, Gujarat, Himachal Pradesh, Meghalaya, Odisha, Rajasthan, and West Bengal notified. Maharashtra EV policy revised to offer additional demand, supply, and charging infrastructure. Karnataka EV policy undergoing a set of revisions, including the announcement of capital subsidies for manufacturing and initial proposals for demand incentives and other concessions for EVs.
OEMs, EV component and battery manufacturers, EVSE companies	<ul style="list-style-type: none"> Companies including Ashok Leyland, Mahindra & Mahindra, Omega Seiki Mobility, Simple Energy, and Tata Motors made announcements to invest a total of over INR 48,000 Cr. (US\$6.5 billion) in electric vehicles, components, and battery manufacturing; electric vehicle supply equipment (EVSE); research and development (R&D); and deployment in 2021.

► Schemes like *FAME II*, *Auto PLI scheme* and *other electric mobility supporting policies* are intended to have a catalytic effect on the market.

Niti Aayog, the federal think tank, published a report titled “India’s Electric Mobility Transformation”, which pegs **EV sales penetration** in India at 70 percent for commercial cars, 30 percent for private cars, 40 percent for buses, and 80 percent for two- and three- wheelers by 2030.

These targets, if achieved, could lead to a net reduction of 14 exajoules of energy and 846 million tons of CO2 emissions over the deployed vehicles’ lifetime.



- ▶ However, it is also critical to understand that the implementation of these schemes need to be equally efficient so that the actual benefits can be passed on to the intended beneficiaries and the economy can reap the benefits in true essence.

3.1 Status Report of Auto PLI (the scheme introduced for elevating the future of Mobility in India)

(A) AN OVERVIEW

The PLI scheme for the automobile sector proposes financial incentives of upto 18% on incremental sales to boost domestic manufacturing of Advanced Automotive Technology products and attract investments in the automotive manufacturing value chain.

Particulars of Scheme	Details
Budget of the Scheme	Rs. 25,938 crores
Expected Fresh Investment via Applications	Rs. 42,500 crores
Proposed investment received by Applications	Rs. 74,850 crores
Incremental Production Expected	Rs. 2.3 lakh crores
Job Creation	7.6 lakhs

Incentives are applicable for determined sales of products manufactured in India from April 1, 2022, for a period of five consecutive years.

PLI Scheme Segment	Number of Applicants Approved	Leading Companies
Champion OEM Incentive scheme	20	Ashok Leyland Limited, Eicher Motors Limited, Ford India Private Limited, Hyundai Motor India Limited, Kia India Private Limited and others
Component Champion Incentive scheme	75	Maruti Suzuki India Limited, Pinnacle Mobility Solutions Private Limited, Bharat Forge Limited, Hero MotoCorp Ltd, Sona Comstar and others

The scheme has two segments

(B) OBJECTIVE

The ever-changing revolution in the Electronic Vehicles (EVs) is the future of automobile sector. There are no doubts in saying that change in the future of mobility will be the new constant with the innovation in EVs.

With this background, the government plans to meet dual objective with the PLI Scheme, i.e.

- ▶ Attracting massive investment to make India a hub for EV as mobility. It includes overcoming cost disabilities, creating economies of scale and building a robust supply chain.
- ▶ The Indian Automotive industry also promises significant employment opportunities. Large number of workers, both skilled and unskilled, will be required to sustain increased level of production. Jobs will be generated through both direct and indirect employment.

As anticipated, it will create additional employment opportunities of over 7.6 lakh jobs.

The Atmanirbhar Bharat vision to make India, self-reliant and self-sufficient has also been addressed in the scheme by introducing special provisions related to:

- Import Substitution
- Promotion of export
- Employment generation
- Special incentives for electric vehicles and components manufacturers
- Incentive for adoption of new technology and reduced pollution

(C) STATUS REPORT AS OF NOW

It is observed that the implementation of the scheme is lagging a bit with respect to expected timelines, viz

- Only the approval letters have been issued to the applicants, without any further way forward
- The guidelines for value addition computation and product testing are still being deliberated by the Ministry of Heavy Industries;
- The awaited discussions for additional products to be added into the “Eligible Products” portfolio under the scheme are still put on hold.

Hence it can be said that the operating flow of the schemes looked prosperous on paper, however needs steering for giving actual fruitful benefits.

3.2 State governments: Adoption of Automobile Mission Plan

- ▶ Since the Central Government of India is pushing its limits for the promotion of EV, now even State Governments themselves are taking the initiative by implementing numerous schemes governed by different statutes. The state governments are also trying to seize the golden opportunity by encouraging the adoption of EV through their different EV policies at respective state level.

To lure the manufacturers the governments are coming out in support of establishing the units and providing different incentives which will help the manufacturers in order to produce the cost effective EVs.

Below is a tabular presentation of different incentives being offered by different states as on date:

State#	Investment Subsidy	Interest Free Loan/ Subsidy	Stamp Duty Exemption	Concessional Registration charges	Land Conversion Fees Reimbursement	Electricity Duty Exemption	Skill development Initiatives
Karnataka	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Maharashtra	Yes	No	Yes	No	No	Yes	No
Uttar Pradesh	Yes	No	Yes	No	Yes	Yes	No
Andhra Pradesh	Yes	No	Yes	No	No	Yes	Yes
Tamil Nadu	Yes	No	Yes	No	No	Yes	No
Telangana	Yes	Yes	Yes	No	No	Yes	Yes

There are various other incentives as per these policies along with certain stipulated conditions tied to them. Further, various other State EV Policies are also underway and shall be announced in times to come.

- ▶ To boost the adoption of EVs, the Delhi government has also announced that they will launch a mobile application to unify locating an electric vehicle charging station in the national capital.

The Government has already installed 427 charging stations during FAME Phase I.

Such a move is expected to give an uplift to the sluggish sales of EVs in the state since a major reason for the hesitancy of EV adoption is the lack of charging infrastructure.

- ▶ Not only this, but there are also various other incentives being offered by the State Government to the buyers of EV, like Road Tax exemptions, Registration Fees exemption, etc. to incentivise them to make wiser choices.

- ▶ As a result, with the synergy of all these efforts the sales of EVs in most of the states have been reportedly increased.

3.3 Other ways of funding to support the cause

(A) Green Climate Fund (GCF)

- The GCF is a one-of-a-kind worldwide platform for responding to climate change by investing in low-emission and climate-resilient development. The Green Climate Fund (GCF) - a critical element of the historic Paris Agreement - is the world's largest climate fund, mandated to support developing countries raise and realize their Nationally Determined Contributions (NDC) ambitions towards low-emissions, climate-resilient pathways.
- Given the gravity of the situation, the GCF has been tasked with making a significant contribution to the global response to climate change.
- The private sector portfolio of the GCF has invested USD 3,418.6 million in GCF resources and received USD 11,126.8 million in co-financing, since its inception.
- Due to India's rapid urbanization, high rate of population growth, and third-highest sector for greenhouse gas (GHG) emissions (approximately 13% of total CO2 emissions), transportation is expected to continue to develop, indicating the need for a drastic transformation.
- A pledge for \$200 million in junior stock has been granted by the GCF to launch India's first leasing and finance firm with an emphasis on electric vehicles. The goal of the blended financing structure is to leverage GCF's commitment to give commercial investors a risk-mitigating cushion while leveraging private sector resources.
- To capitalize the platform, Macquarie plans to attract an additional \$US205 million from institutional investors. Over time, the platform hopes to raise a total of \$US1.5 billion in the capital (including debt finance).
- This is GCF's first investment in a private sector institution in the **transportation industry** and its largest commitment to a single country in terms of equity.

(B) Other Fund Arrangements supporting the EV Sector

- Axis Bank and the United Kingdom's Private Infrastructure Development Group (PIDG) announced a capital financing guarantee of INR 1,500 crores (US\$200 million) towards manufacturing, distribution, and servicing of EVs, batteries, components, and charging infrastructure.²
- In India, NITI Aayog and the World Bank are setting up a \$US300 million first-loss risk-sharing instrument. The instrument is intended to act as a hedging and guaranteeing mechanism that banks and NBFCs can access in the event of payment delays on EV loans. The programme is expected to bring down the financing costs for EVs by 10-12 percent. Up to \$US1.5 billion could be mobilised because of the instrument.

3. India's commitment at Global Forum - Relevant for the functioning of the Indian Automobile Industry

- ▶ India has been a part of the Paris Agreement, 2015 and has committed to reduce the emission intensity by 33% - 35% by 2030. The steps are being taken to fulfil the commitments globally by other parties to the said agreement. The Global Climate Fund is a result of this itself.

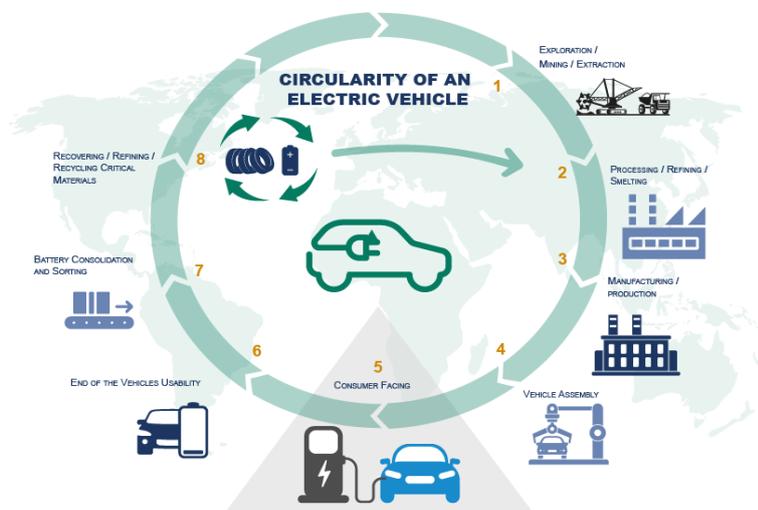
² Report published by NITI Aayog, RMI, and RMI India, *Banking on Electric Vehicles in India: A Blueprint for Inclusion of EVs in Priority Sector Lending Guidelines, January 2022*

- ▶ In similar spirit, recently the Hon'ble Prime Minister of India, at COP (conference of parties) 26 at United Nations Framework Convention on Climate Change, proposed a 'One-Word Movement', to the global community. This one word is *L-I-F-E* i.e., *Lifestyle for Environment*. The vision of LIFE is to live a lifestyle that is in tune with our planet and does not harm it.
- ▶ India's updated NDC (Nationally Determined Contribution) also captures this citizen centric approach to combat climate change. The updated NDC also represents the framework for India's transition to cleaner energy for the period 2021-2030.
- ▶ The updated framework, together with many other initiatives of the Government, including tax concessions and incentives such as Production Linked Incentive scheme for promotion of manufacturing and adoption of renewable energy, will provide an opportunity for enhancing India's manufacturing capabilities and enhancing exports.

It will lead to an overall increase in green jobs such as in renewable energy, clean energy industries- in automotive, manufacturing of low emissions products like Electric Vehicles and super-efficient appliances, and innovative technologies such as green hydrogen, etc.

4. Sustainability and Circular economy

No industry can work in isolation, and same is the case with the Indian Automobile Industry as well.



As natural resources become more and more scarce, sustainable value chains are becoming more and more important for the automotive industry.

They are based on the principle of reusing and recycling resources.

Creating transparency along the supply chain is critical. This is the only way to trace the origin of parts and ensure sustainability along the value chain.

The government and EV OEM /components manufacturers should consider how to implement innovative solutions such as a circular economy, battery recycling, biodegradable components and sustainable processes in research, development and manufacture.

Therefore, with all the ongoing developments and the market demand, it also becomes necessary to take a step back and have a look at the broader vision of the economy as whole so that careful steps can be taken for each sector, including the Automobile Sector as well.

All the points and the views captured hereabove captures the essence of support and the incentives needed by the Automobile Industry in India to reach the intended global targets that have been set by the authorities.

Thus, the opportunity for a major thrust is upcoming in this sector, and the companies who ride this wave with strategic efforts can achieve greater heights in the foreseeable future.

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**Disruptive dimensions of mobility
in India's new "Green Age"**

by

RACeninrac



RACenirrac

Disruptive dimensions of mobility in India's new "green age"

Harnessing step change towards sustainable transportation

www.enirrac.com

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Disclaimer: This report is solely based upon existing data and material, and the related analysis of the proprietary voice of consumer's (VoC) survey questionnaire to selected stakeholder's network. Views expressed in the report highlight the aspects that may be considered in line with fostering disruptions in India's mobility which are oriented for sustainability.



Disruptive dimensions of mobility in India's new "green age" 2022



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Disruptive dimensions of mobility in India's new "green age" 2022



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Index.

1

Tracking Mobility Transformation

Section 1

This section covers the transformation map of mobility in India from conventional to green alternatives

06

2

Sustainable Transportation Initiatives

Section 2

This section covers the need for sustainable mobility in India through a devised framework encompassing public transportation, shared mobility, electrification and soft modes of transportation

09

3

Pillars & Foundation Elements for Mobility

Section 3

This section deals with key pillars of mobility in India which shall be crucial to ensure sustainability and the extent of potential savings involved thereof

10

Index.

4

Future of transport system in India

Section 4

This section covers the autonomous vehicle scenarios under different levels and its respective sales fleet & travel projections. Also, an estimate of vehicle market share in India for AVs is tracked

11

5

Expanding EV Adaptation in India

Section 5

This section covers the EV landscape in India with incentive map and small format mobility, suitability for the country

12

6

Making EVs Profitable

Section 6

This section considers the roadmap which can transform EVs into a profitable proposition in India specially covering the cost map for battery pack and BMS while comparing the EVs & ICEs

18

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Online

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Index.

7

Way Forward for India's Sustainable Mobility Plan

Section 7

This section covers the actions needed for the sustained growth of cleaner mobility in India

23

8

Key Takeaways

Section 8

This section involves the steps to increase the penetration of EVs in India and its current status map

24

9

About Eninrac

Section 9

25

1.Tracking Mobility Transformation in India



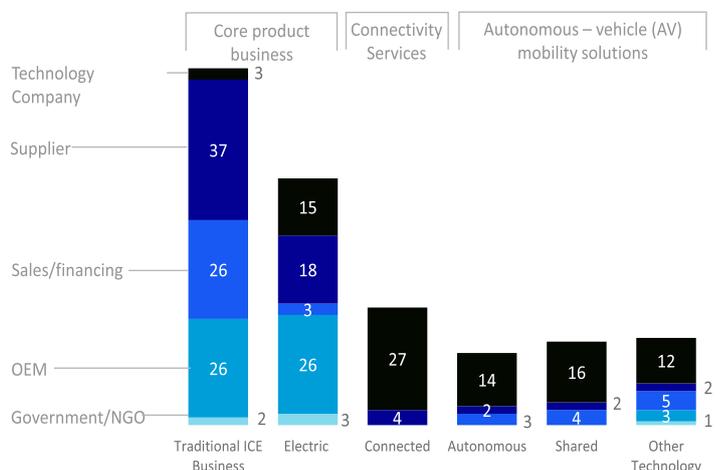
Global future mobility ecosystem

Globally, the mobility ecosystem is undergoing a transformational, technological and economic shift which is fundamentally changing the way people and goods are being moved. The automotive sector coupled with transport are experiencing heavy disruptions, with new markets originating, the existing ones showing converging dynamics and others witnessing a declining trend which shall end up into vanishing existence. Many new age start-ups and new market entrants are challenging the incumbents who are focused on leveraging their experience and develop a sustainable market model. The mobility transformation is majorly driven by three main trends:

- Electrification of vehicles and availability of alternative power trains
- Connected and autonomous vehicles
- Mobility-as-a-Service (MaaS)

Significant investments have been routed globally among the above listed trends, wherein each have great potential to disrupt the entire mobility ecosystem. Coupled with advent of greener alternatives as fuel like hydrogen cells and bio-fuels, the current vehicle ecosystem shall radically become more efficient, data enabled and sustainable. As the ecosystem for mobility would keep evolving its anticipated market size is expected to tip a whopping \$1 Trillion by 2030.

Exhibit 1: Total new OEM partnerships since 2014 till 2022 by organization type, number

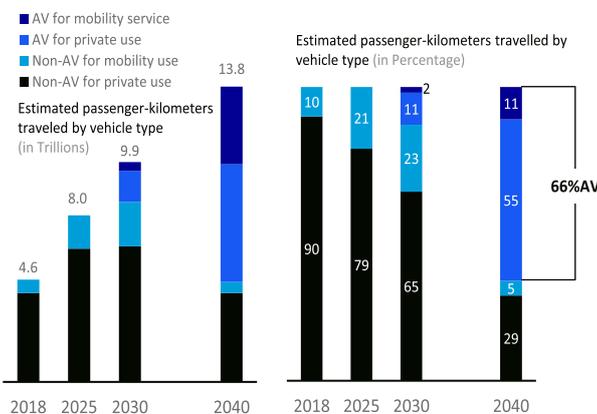


Source: eninrac research & analysis, McKinsey

Autonomous – vehicles (AV) likely to take front seat by 2040 globally!

China is expected to lead the global markets for AVs and has the potential to be the largest one by 2040. It is likely that the share of AVs will contribute approximately 70% of the passenger-kilometers travelled in 2040 which can attract a revenue of \$1.1 trillion from mobility services and \$0.9 trillion from sales of autonomous vehicles by that year. To understand that in terms of number of vehicles will make up just over 40% of the new vehicle sales in 2040, and nearly 12% of vehicle installed base.

Exhibit 2: AVs to contribute 40% of new vehicle and nearly 12% vehicle installed base

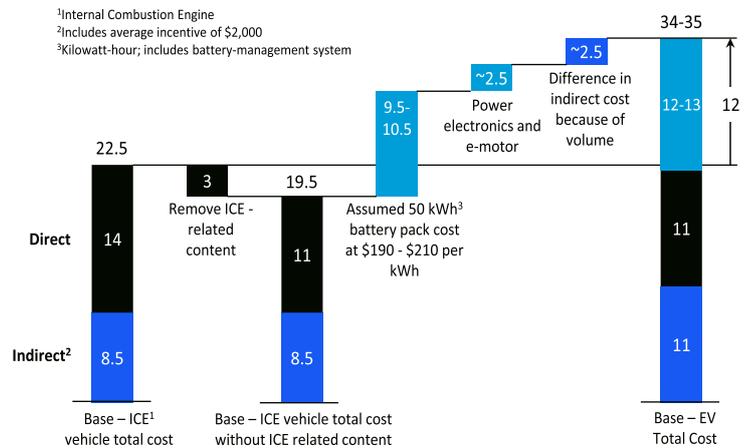


Source: eninrac research & analysis, McKinsey

Challenge to transform EVs to profitability remains to be tamed

The challenge to make EVs profitable remains to be addressed globally. Although, OEMs along the globe are working hard to bring the cost gap of EVs and ICE down but it will take some time to reach at par. Currently a gap of nearly \$ 12000 exists between EVs and ICE which is massive for country like India. Battery pack remains the biggest cost driver for EVs around the globe for which the OEMs are focused upon native EV design and cooperation among each other to bring down the costs. There is an ardent need to scale up battery manufacturing so that EVs could become a sustainable option in long run.

Exhibit 3: Cost-Walk of ICE¹ & EV C-Car (Estimated average per vehicle, \$'000)

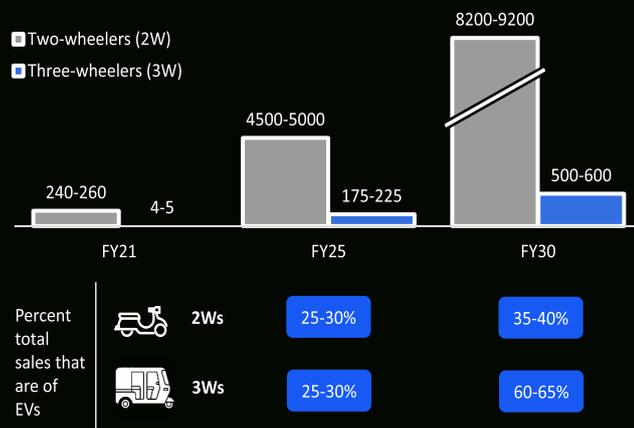


Source: eninrac research & analysis, UBS & McKinsey

Demand for 2W & 3W e-mobility will lead India's surge for electric vehicles by 2030

The demand for small format e-vehicles in India is witnessing a north-bound trend and is likely to drive the EV ecosystem in the country. It is estimated that by 2030 the 2W & 3W fleet size could reach or cross 9 Million on cumulative basis. Further the push for augmenting the infrastructure to help lead the EVs penetration is quintessential in the country.

Exhibit 4: Estimated demand of electric 2W and 3W in India ('000 units Base Case)

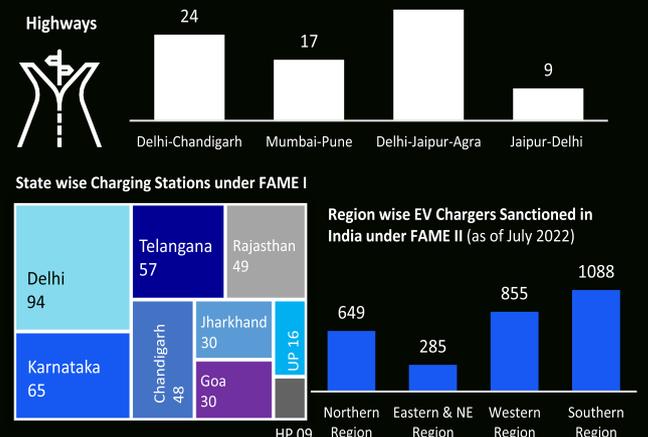


Source: eninrac research & analysis, UBS & McKinsey

EV charging stations & chargers will need adequate push to enable sustainable growth electric mobility in India

The EV charging stations sanctioned by Ministry of Heavy Industries, GoI stands at 520 of which 479 have been installed till July 2022. The spread of 479 involves 398 installed in different states and 81 charging stations on highways as indicated in Exhibit 5.

Exhibit 5: EV Charging stations installed under FAME I on highways in India as of July 2022 & Region wise EV Charger sanctioned under FAME II



Source: eninrac research & analysis,

2. Sustainable Transportation Initiatives in India

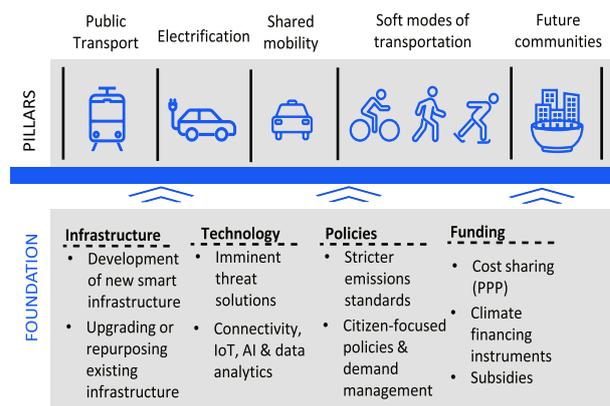


India & sustainable mobility – Need of the hour

India is not completely starting from scratch in terms of sustainable transportation initiatives. Both at the concurrent Government levels steps have been taken to bring initial investments in new transportation modes and technologies.

- a. **Electric Vehicles:** Electric buses are already plying in various Tier I and Tier II cities in India since last couple of years. Delhi has recently got a dedicated EV bus fleet to meet the demand of local public transport in the region.
- b. **Shared Mobility:** Like e-mobility the shared mobility demand for shared mobility is going to rise as well in the country. This shall at large be driven by three use cases like e-commerce/small format, food delivery & grocery delivery. The growth for these use cases shall exceed 40%-50% if the penetration of EVs are being supported by supportive ecosystem.
- c. **Micromobility:** In the country in cities like Delhi, Bangalore & Ahmedabad are offering e-scooters and docked bicycles. Delhi metro also offers e-bicycles on rentals and has seen shared mobility penetration in the city.
- d. **Mass Transit:** There has been significant investment in metro projects and mass rapid transit systems in the country. All major cities are having either the running metro projects or are having them under construction.

Exhibit 6: Framework of action plan on sustainable mobility in India



Source: eninrac research & analysis

The framework for India to adapt a sustainable mobility model will have five major contributing pillars on a foundation of four key elements of infrastructure, technology, policies & funding respectively.

3. Pillars & Key Foundation Elements for Mobility in India



Identified Pillars of Mobility in India

India is a vast country and with growing population the nature of public transport, goods movement and other mobility shall have to adapt accordingly. For this the identified pillars are depicted as below:

- a. **Public Transport:** A multi-modal, integrated, and robust public transport system is central to sustainable mobility systems. Governments at concurrent levels should continue to invest in these systems, with the goal of eventually shifting to a fully electric fleet. Advancing public transport ridership has allowed urban areas across the globe to overcome many less-than-efficient mobility and societal outcomes.
- b. **Electrification:** GoI has already enabled incentives coupled with State level incentives on offer for greater adoption of EVs. With this intent the country witnessed nearly 0.55 Million of EVs sold within a period extending from January to August 2022 which is anticipated to reach beyond 0.8 Million by December 2022. This shall be leading to almost 65% yoy growth for the same period in 2021.
- c. **Shared Mobility:** Cities in India can move commuters more efficiently by reducing the reliance on personal vehicles and using shared mobility solutions to increase riders per vehicle. The market expansion of ride-hailing players like OLA & Uber has proven that shared mobility as a business model works well within a lightly regulated market, while improving asset utilization.

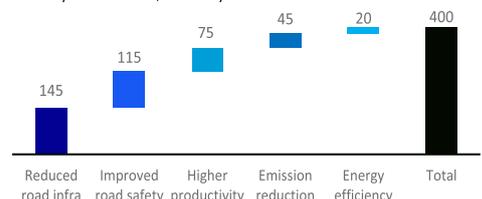
- d. **Soft Transport Modes:** Micromobility solutions can increase the options for urban residents and increase usage of public transport by addressing first-mile and last-mile connection challenges. State governments should continue to deploy such alternatives as bike-sharing and e-scooters in major cities apart from Delhi, Mumbai, Bengaluru and Chennai.
- e. **Future Communities:** Governments can reduce the need for transportation through sustainable urban designs that use new living and community concepts to make vital goods and services available within walking distance from residential areas

Key Foundation Elements of Mobility in India

The key elements which are fundamental to have sustainable mobility in the country shall be:

- Adept Infrastructure
- Higher Technology Penetration
- Right Policy Environment
- Oriented Capital Expenditure & Funding

Exhibit 7: Economic value creation potential of sustainable mobility in India in US\$ Billion by 2040



Source: Channel Checks, eninrac research & analysis

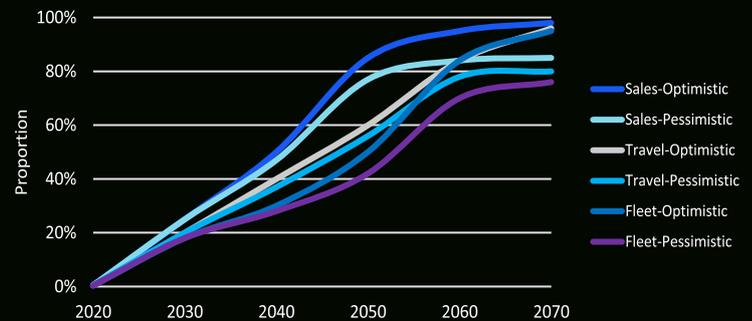
4. Future of Transport System in India – AV & Vehicle Market Share



Automation Level/Scenarios	Description
Level 0	No Automation
Level 1	Automation of one primary control function, e.g, cruise control, self-parking etc.
Level 2	Partial driving automation. Automation of two or more primary control functions which can work together to relieve the driver of control of those functions
Level 3	Conditional driving automation. The vehicle can control all safety-critical function under certain traffic or environmental conditions
Level 4	High driving automation. Self-driving without human controls, with a well-defined operational design with operational capability even if a human driver doesn't respond
Level 5	Full driving automation. Self-driving. Automation without human controls in all driving environments that can be managed by human driver.

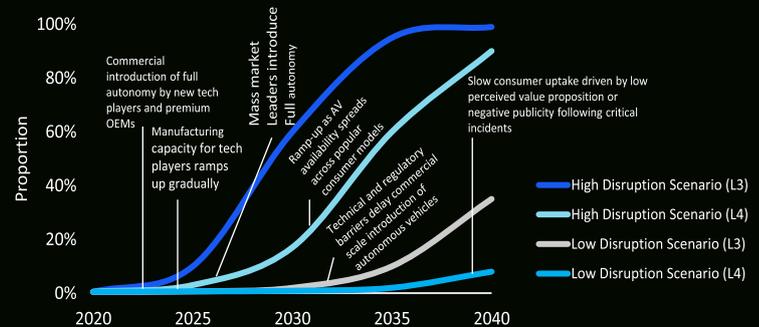
Source: Society of Automotive Engineers, eninrac research

Exhibit 8: Autonomous vehicles sales, fleet & travel projections in India by 2070



Source: eninrac research & analysis, Litman

Exhibit 9: New vehicle market share of self-driving vehicles in India



Source: eninrac research & analysis, McKinsey

5. Expanding EV Adaption in India



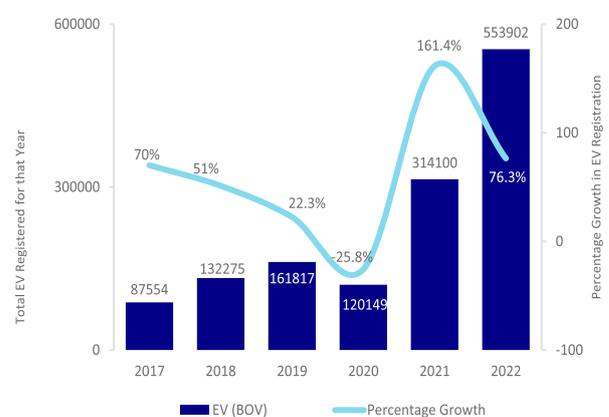
Electric vehicle landscape in India

The electric vehicle landscape is rapidly changing in India as both technology and interest evolve, and the coming years will see many more EVs take to the roads, seas, and skies. In India, electric vehicles sales has grown at a CAGR of 83% since 2018 till 2022, making the total EV count to reach a hallmark of 1.4 Million in Aug'2022.

Considering the same growth only that Indian EV sales has witnessed over the past four years, it is anticipated that the total EV count in India will hover around 9.1 Million by 2036 —providing both a glimpse of a green future and significant economic opportunity. As the central and respective state governments are giving impetus on developing the electric vehicle segment in the country, the progress is seen at concurrent levels. In India, presently 20 states have announced their EV policies for encouraging EV manufacturing, EV demand and development of supportive charging infrastructure. In this regards, Faster Adoption and Manufacturing of (Hybrid &) Electric Vehicles (FAME I & II) was launched. FAME I was launched in 2015, while FAME II was introduced in 2019 with more embellished EV targets.

Phase-II of FAME India Scheme was notified on 8th March 2019 for a period of three years commencing from 1st April 2019, with a total budgetary support of Rs. 10,000 crore. This phase mainly focusses on supporting electrification of public & shared transportation and aims to support through subsidies - 7090 e-Buses, 5 lakh e-3 Wheelers, 55000 e-4 Wheeler Passenger Cars and 10 lakh e-2 Wheelers. Till July 2022, about 4.7 lakh electric vehicles have been supported under FAME II by the way of demand incentives.

Exhibit 10: YoY additions in Electric Vehicle (BOV) registrations in India from 2017 till 2022



Source: eninrac research & analysis, MORTH

Key initiatives taken by GoI for adoption of EVs in India

Increase in demand incentive for e-2W : The demand incentive for electric two wheelers (e-2W) has been increased to INR. 15,000/KWh from INR. 10,000/KWh with an increase in cap from 20% to 40% of the cost of vehicle from 11th June 2021, thus enabling cost of Electric two wheelers at par with that of ICE two-wheeler vehicle

Introducing production linked incentive (PLI) : The GoI on 12th May 2021 approved a Production Linked Incentive (PLI) scheme for manufacturing of Advanced Chemistry Cell (ACC) in the country in order to bring down prices of battery in the country. Drop in battery price will result in cost reduction of electric vehicles

Incentivizing EVs under PLI : Electric Vehicles are also incentivized under Production Linked Incentive (PLI) scheme for Automobile and Auto Components, which was approved on 15th September 2021 with a budgetary outlay of Rs. 25,938 crore for a period of five years

Reduction of GST on EVs: GST on electric vehicles has been reduced from 12% to 5%; GST on chargers/ charging stations for electric vehicles has been reduced from 18% to 5%

Exempting battery operated vehicles from permit requirements: Ministry of Road Transport & Highways (MoRTH) announced that battery-operated vehicles will be given green license plates and be exempted from permit requirements

Waiving road tax: MoRTH issued a notification advising states to waive road tax on EVs, which in turn will help reduce the initial cost of EVs.

Sale of electricity as "service": Ministry of Power, India has allowed sale of electricity as 'service' for charging of electric vehicles. This would provide a huge incentive to attract investments into charging infrastructure

Reduction in the interest paid on loan of EVs: In the Union Budget of 2019-20, the Ministry of Finance, India announced provision of additional income tax deduction of INR 1.5 lakh on the interest paid on loans taken to purchase electric vehicles

Ease in grant of driving license : The Ministry of Road Transport & Highways, India has notified certain specifications for the grant of license to age group of 16-18 years to drive gearless E scooters/ Bikes upto 4.0 KW

Providing EV charging stations in private & commercial buildings : Ministry of Housing and Urban Affairs, India has made amendment in the Urban and Regional Development Plans Formulation and Implementation (URDPFI) guidelines to provide for electric vehicle charging stations in private and commercial buildings

Small format mobility – ideal for India's EV expansion vision

Covid'19 has presented the globe with an unprecedented economic, humanitarian & healthcare challenge. India was no different, a serious setback was witnessed by country's industrial segment, with automotive being among the hardest hit sector. In 2018, India's auto industry experienced a sharp decline in the sales of commercial vehicles after the regulatory change in the axle load norms. Credit availability fell, demand slowed (especially in infrastructure and mining), and discretionary spending dropped, all of which contributed to a decline in auto sales. In early 2020, just as the industry was expected to recover, the pandemic added to the pain of already plummeting sector. Covid'19 further increased – cash flow tightening , supply chain disruptions, delays in raw material sourcing and decreased – consumer demand , imports, labor availability. Although many challenges were faced by the auto segment , but the covid'19 accelerated some beneficial trends as well. For example, demand of electric two wheelers & three wheelers increased because of the growth of various use cases, such as last-mile delivery, ride hailing, and rentals.

Some of the most exciting developments that relates to the growth of electric vehicles in India is the – small format mobility, which includes electric (e) 2 W & 3W. Looking into the growth trajectory of EVs in India of past five years , it is pertinent to note that the same has increased at a CAGR of approximately 29% from 2018 till Aug 2022, courtesy e-2W & 3W. For e-2Ws much of the demand is witnessed by low to medium income group people, fleet aggregators that deals in – last mile deliveries, bike taxis etc. such as Zepto, Blink it, Zomato, Swiggy, Ola, Uber etc. For the e-3Ws, a lot of demand is observed for the e-rickshaws from the riders due to its affordability. Also, with the increase in ecommerce options, e-bulk order home deliveries etc. - many such service providers have also started adopting e-3W good carriers for meeting door to door deliveries of bulk items.

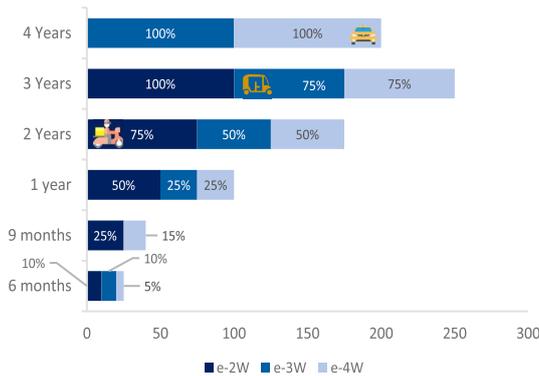
Within the small format segment, several enablers are already encouraging the growth For instance, small format EVs achieve faster parity with traditional internal combustion engine (ICE) vehicles, as their total cost of ownership (TCO) is lower, given their lower fuel and maintenance costs. They are also less dependent on charging infrastructure, since their power requirements are lower, and they are more likely to come in models that allow battery swapping. Both features may alleviate concerns about vehicle range. Some of the key developments that could help the small-format e mobility market in India are as follows –

Incentives from India's central and state governments to encourage EVs: The Faster Adoption and Manufacturing of Hybrid and EV (FAME) program, which was first implemented in 2015 and updated in 2019, provides consumers and domestic companies with various incentives. For instance, in phase two of FAME, the government announced an outlay of USD 1.4 billion till 2022. In addition to subsidizing EV purchases and essential infrastructure development, the funding will provide local manufacturers with incentives to produce EVs

Dedicated policies by respective state governments to involve EVs in the commercial fleet: In July 2022, the government of Delhi announced the draft aggregator fleet scheme. One of the key feature of this scheme was setting targets to have more electric vehicles in the fleet managed by the aggregators such as -Ola, Uber, Meru Cabs, Zomato, Swiggy and even other services operational in the National Capital Territory of Delhi. The entire fleet should comprise electric vehicles by April 1, 2030.

Small format mobility – ideal for India’s EV expansion vision

Exhibit 11: Target to achieve new EV fleet by 2026 from the launch of the scheme



Source: Government of Delhi

Lower battery pack prices: According to industry estimates, the price of a battery pack in India could fall to USD 110 to USD 120 by 2030, making EVs much more affordable. A combination of scale, technology, and market maturity will drive this decline

Increased consumer readiness: Across use cases, more consumers must be willing to opt for EVs over ICE vehicles. As per industry insights, one major roadblock is the perceived safety of EVs. This was the top concern after TCO and the availability of charging infrastructure. As more EVs hit the road, and as consumers become more familiar with them, their comfort level may increase

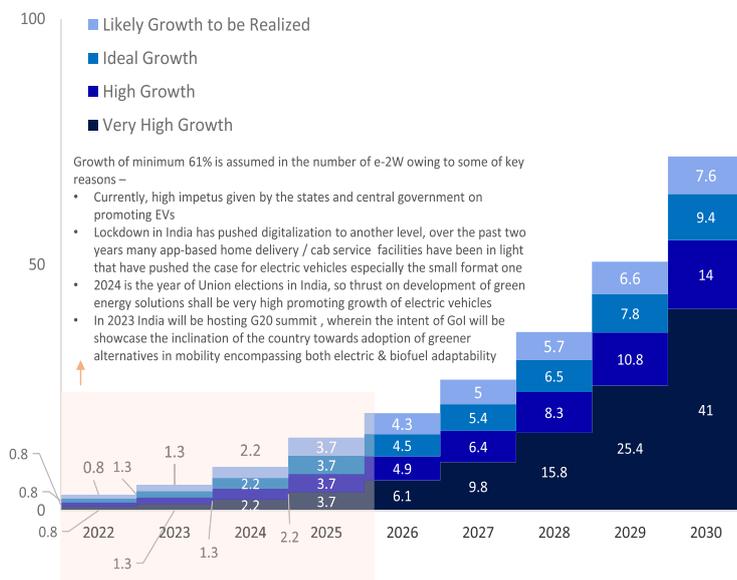
Eninrac analysis suggest that demand for small-format e-mobility options could rise substantially over the next decade. For 2W e-vehicles, sales could reach upto 41 Million by 2030 in the most optimistic scenario (i.e., very high growth scenario), while the bare minimum growth shall lead the number of EVs around 7-8 Million. Exhibit 3 presents four growth scenarios for e-2W in India till 2030.

Like e-mobility, demand for shared mobility is expected to increase in the next decade, largely driven by three use cases. For 2W vehicles, last-mile delivery for food, grocery, and e-commerce is the major demand driver. Other popular 2W use cases include ride hailing and self-driving rentals, with YoY growth of 40 to 50 percent and 100 percent, respectively, through 2025. For 3W vehicles, passenger mobility will be the greatest demand driver, with expected YoY growth of 40 to 50 percent, followed by goods delivery, with YoY growth of 14 to 16 percent.

Small format solutions mobility – ideal for India’s EV expansion vision

Exhibit 12: Scenario wise Anticipated Growth (Numbers in Million) of e-2W in India till 2030

Number of e-2W (Millions)



Source: eninrac research & analysis, Channel Checks

“Anticipated number of EVs that can be realized in India till 2030 shall hover between 50-60 Million with An average growth of 39%. This can be possible with growth in the supportive charging infra, grid facilitation, increase in user index value, reduction in battery prices, continued policy support from central & state government etc.” – Eninrac Research

Assumptions :

- The anticipated numbers are for the calendar year(i.e., from Jan-Dec)
- Analysis is done on the current share of e-2W in total EVs. Currently e-2W constitute 32% of total EVs in India
- The yoy growth assumed from 2022 to 2025 is 61%*
- *indicates growth witnessed from 2021 to 2022
- Very high growth scenario (VHGS) signify 61% yoy growth in the e-2W from 2025 to 2030
- High growth scenario (HGS) signify 30% (half of the growth from VHGS) yoy growth in the e-2W from 2025 to 2030
- Ideal growth scenario (IGS) signifies 20% (one-third of the growth from VHGS) yoy growth in the e-2W from 2025 to 2030
- Likely to be realized growth (LRG) signifies 15% (one-fourth of the growth from VHGS) yoy growth in the e-2W from 2025 to 2030

Small format mobility – ideal for India’s EV expansion vision

Exhibit 13: Anticipated growth in the electric vehicles in India till 2030

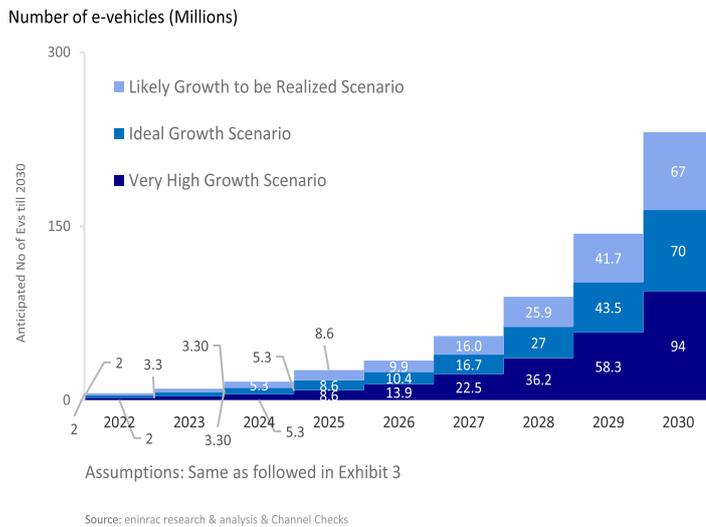


Exhibit 14: Number of use case will drive growth in shared mobility for small-format vehicles

	Use case	Kms travelled per day	Growth rate (2030)
	E-commerce/ small format	90-100	17-20
	Food delivery	120-130	17-20
	Grocery delivery	70-80	27-35
	Self-drive rentals	30-40	100
	Ride hailing	70-80	40-50
	Goods mobility	110-120	15-17
	Passenger mobility	120-130	35-45

Source: eninrac research & analysis, McKinsey & Channel Checks

6. Making EVs Profitable



Cost advantages of small format electric mobility

Covid'19 has presented the globe with an unprecedented economic, humanitarian & healthcare challenge. India was no different, a serious setback was witnessed by country's industrial segment, with automotive being among the hardest hit sector. In 2018, India's auto industry experienced a sharp decline in the sales of commercial vehicles after the regulatory change in the axle load norms. Credit availability fell, demand slowed (especially in infrastructure and mining), and discretionary spending dropped, all of which contributed to a decline in auto sales. In early 2020, just as the industry was expected to recover, the pandemic added to the pain of already plummeting sector. Covid'19 further increased – cash flow tightening, supply chain disruptions, delays in raw material sourcing and decreased – consumer demand, imports, labor availability. Although many challenges were faced by the auto segment, but the covid'19 accelerated some beneficial trends as well. For example, demand of electric two wheelers & three wheelers increased because of the growth of various use cases, such as last-mile delivery, ride hailing, and rentals.

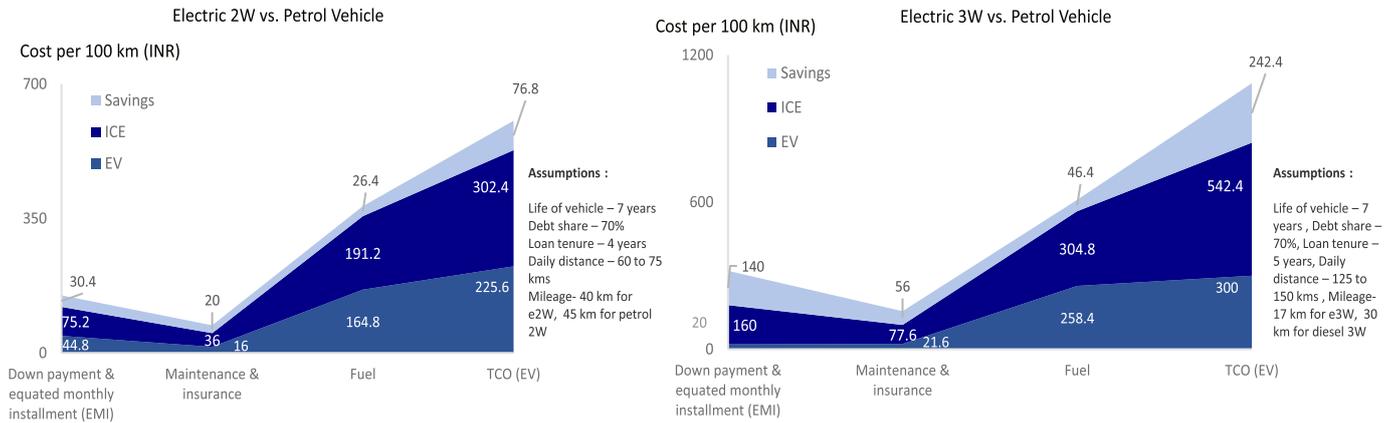
Some of the most exciting developments that relates to the growth of electric vehicles in India is the – small format mobility, which includes electric (e) 2 W & 3W. Looking into the growth trajectory of EVs in India of past five years, it is pertinent to note that the same has increased at a CAGR of approximately 29% from 2018 till Aug 2022, courtesy e-2W & 3W.

For e-2Ws much of the demand is witnessed by low to medium income group people, fleet aggregators that deals in – last mile deliveries, bike taxis etc. such as Zepto, Blink it, Zomato, Swiggy, Ola, Uber etc. For the e-3Ws, a lot of demand is observed for the e-rickshaws from the riders due to its affordability. Also, with the increase in ecommerce options, e-bulk order home deliveries etc. - many such service providers have also started adopting e-3W good carriers for meeting door to door deliveries of bulk items. Within the small format segment, several enablers are already encouraging the growth. For instance, small format EVs achieve faster parity with traditional internal combustion engine (ICE) vehicles, as their total cost of ownership (TCO) is lower, given their lower fuel and maintenance costs. They are also less dependent on charging infrastructure, since their power requirements are lower, and they are more likely to come in models that allow battery swapping. Both features may alleviate concerns about vehicle range.

If we compare an electric bike with a petrol bike's cost, an electric bike take 2-5 unit's electricity to fully charged and the cost of electricity is INR 4-8 per unit (it shall vary as per the living area). If we talk about petrol bikes, then their average is 40 to 50 km per liter and its cost will be around INR 90 to 110. The cost of electric bike is around INR 5000 for 50,000 km, that is; 1km=10-15 paise and a petrol bike costs around INR 1 Lakh for 50,000 km that is; 1 km = INR.2

Cost advantages of small format electric mobility

Exhibit 15: Cost advantages of small format electric mobility over conventional vehicles



Source: eninrac research & analysis, McKinsey, Industry Interactions

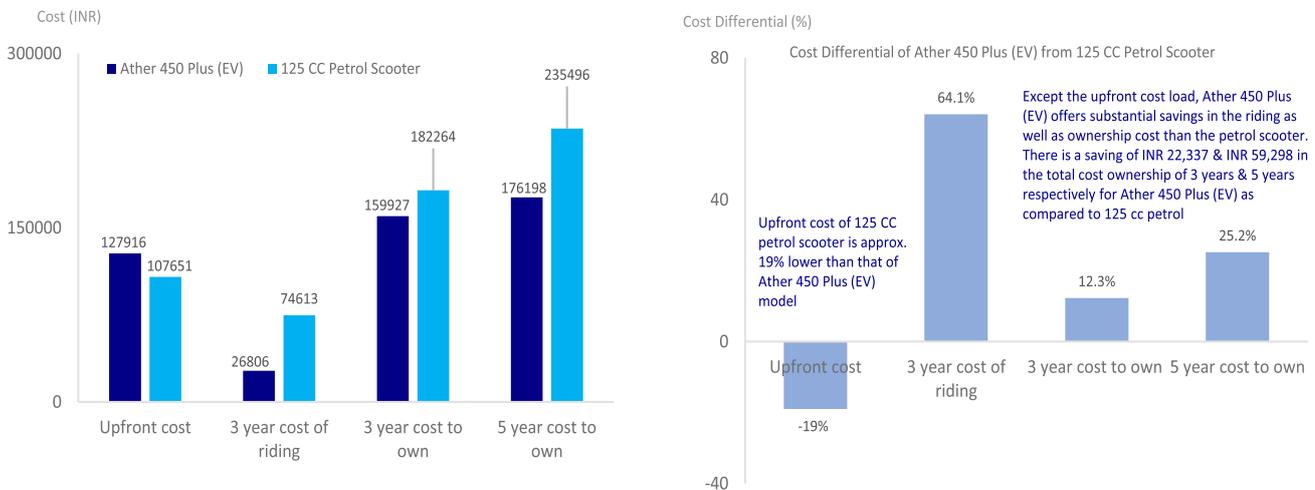
Speaking about the maintenance cost linked with the petrol scooter, let's understand the cost outlay for a period of 3 years

- Petrol scooters contain a lot of moving parts and an oil-filled engine. Most petrol scooters have annual maintenance expenditures of INR 6,000, equating to INR 18,000 over a three-year period
- Keep in mind that petrol scooters have a lot of parts, including an engine, transmission, gearbox, converters, filters, and engine parts. These can malfunction, necessitating replacement or repairs. Let's assume that part repair/replacement costs total Rs 6,000 over the course of three years. So, during a three-year period, the total maintenance cost for a petrol scooter could be INR 24,000

“The per kilometer cost of electric bike costs around 10-15 paise, while that of a petrol bike costs around INR 2” – Zypp Electric

Cost advantages of small format electric mobility

Exhibit 16: Total cost ownership comparison of Ather electric scooter with 125CC petrol scooter



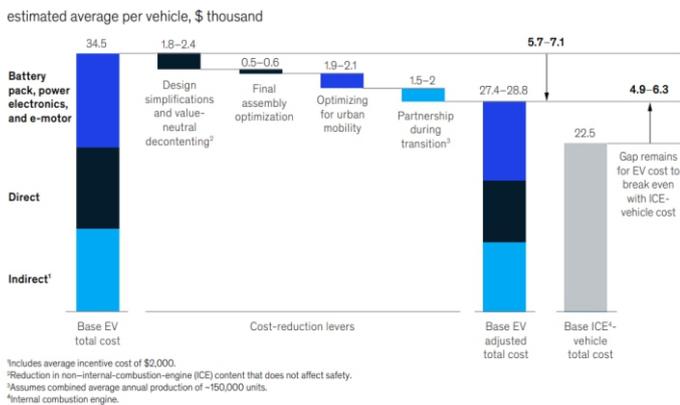
Source: eninrac research & analysis, Ather Energy, Industry Interactions

Making EVs profitable

Optimizing electric vehicle designs for the market: OEMs can reduce their EV costs by nearly 20% by pursuing strategic de contenting paired with a dedicated EV platform. This could be accomplished leveraging new freedom in design unlocked by using electric rather than ICE subsystems and applying leading strategies in low-cost ICE design and from cutting-edge EV-focused OEMs.

Exhibit 17: Cost reduction levers could bring down electric vehicle costs considerable

Base electric-vehicle (EV) total cost, with cost-reduction levers



Source: McKinsey, Industry Interactions

Design simplifications: OEMs can take lessons from leading e-vehicle concepts, for which our proprietary teardown study revealed that cockpit, electronics, and body simplifications netted up to \$600 in reduced costs, without removing core feature content tied to value generation for the OEM. Eliminating extra displays, buttons, switches, wiring, modules, and additional structural components, as well as reducing the overall design complexity, drove major savings. As per industry interactions, companies can extract component savings of 20 to 30 percent with these design approaches, including by adjusting material specifications and negotiating with suppliers with the shared objective of EV profitability

Optimizing urban mobility: For many customer segments, today's EVs offer either too little driving range, such as smaller EVs with ranges of fewer than 160 kms, or too much, such as luxury EVs with ranges of approximately 482 kms, when compared to actual driving patterns. The average vehicle kms traveled (VKT) for an urban population is around 30-35 kms per day in India, and it increases to around 40-50 kms per day when accounting for demographic groups that drive more. Assuming today's battery efficiency in kilowatt-hours (kWh) per mile, a potential sweet spot for urban customers is approximately 25 kWh of energy. However, if we account for consumer preference to use the same vehicle for suburban and occasional rural travel, the optimal battery capacity increases to approximately 40 kWh, equating to ~250 kilometers, based on average VKT in rural areas. A reduction in battery capacity to 40 kWh, from 50 kWh, would save \$1,900 to \$2,100 today, while the range would still enable most consumers, especially those in urban environments, to complete trips without any sacrifice to their daily routines.

Making EVs profitable

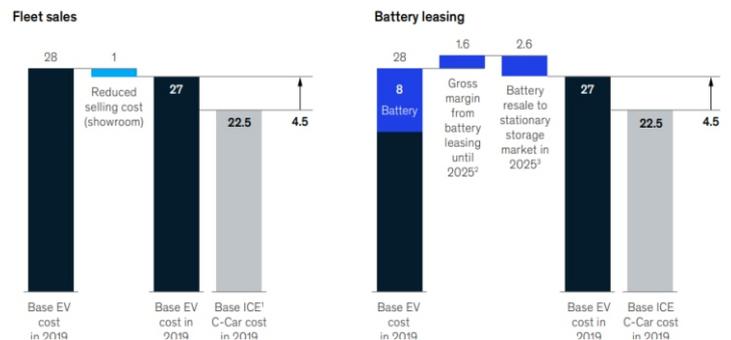
Final assembling optimization: As per industry insights, EV design also suggests that a purpose-built EV platform is simpler to assemble and could deliver up to \$600 in savings per vehicle in lower fixed-cost allocation. That savings come from having fewer components to assemble in an optimized EV platform and requiring less capital in EV-only plants versus complex plants that combine ICE-vehicle and EV lines

Partnership during transition: During the next five to seven years, as the industry transitions toward electrification but struggles with profitability, automakers should more strongly consider partnering and collaborating with competitors. At a time when OEMs face the possibility of retooling numerous models and platforms for electrification, collaborating with other OEMs can reduce the fixed-cost burden of R&D, tooling, and plants. Benefits will be especially high if OEMs can share EV platforms and plants, which can still enable multiple model variants. These alliances will also be most beneficial when they enable higher-volume procurement of the same battery cells and power electronics to take advantage of scale that is otherwise elusive when going it alone. In fact, some automakers have already announced a range of different global partnerships focused on reducing the cost of designing and producing EVs.

Exploring new business models: Automakers that take a bolder approach to closing the profitability gap can also experiment with a range of new business models for niche segments. For example, ideas include targeted direct sales to fleets and battery leasing. Economically, it makes sense to target fleet customers with EV models, given that these fleets typically fall into a high-mileage category in which the total cost of ownership (TCO) of EVs is beneficial—and they prioritize TCO higher than other buying factors. Direct selling to these customers can reduce selling costs. OEMs could offer to lease batteries separately from the vehicle and resell older batteries to the stationary storage market for secondary use. Battery leasing has a potential to attract consumers who shy away from purchasing an EV due to uncertainty in performance and degrading capacity of batteries today

Exhibit 18: New business models , such as fleet sales and battery leasing , could improve profitability

Base electric-vehicle (EV) total cost with new business models for improved profitability, price per vehicle, \$ thousand



1. Internal combustion engine.
2. Assumes 5-year leasing period; assumes 30% gross margin on depreciated value of battery pack
3. Assumes 70% original capacity; assumes resale to remanufacturer at ~\$65 per kilowatt-hour in 2025 (assume no margin by OEM on resale of battery pack; remanufacturer could potentially derive margin from repurposing battery pack)

Source: McKinsey, Industry Interactions

7. Way Forward for India's Sustainable Mobility Plan



Looking at the road ahead, India aspires to reach its vision of 100% EVs by 2030. Surely, factors such as increasing government support, decreasing cost of technology, growing interest of the country in EVs, distressing pollution levels, would accelerate India's transition to EVs and enable the government to near its vision. However, there is still a long way to go. India's progress on electric mobility has been commendable, but the transition will certainly take place at a steady pace. What is important is that the right path has been laid and the shift has started to happen.

Actions needed for sustained growth of cleaner mobility in India

- a. **OEMs:** Re-imagination GTM strategy for OEMs in India is required especially in a post-pandemic era. The pandemic has increased consumer comfort with contactless purchases, and 25 percent of Indian customers are now willing to use digital channels to buy high-value items.⁷ As in other countries where e-commerce has taken off, businesses are most likely to win if they offer a seamless omnichannel experience, where customers can easily switch among modes as they consider and purchase items. To manufacture EVs or their components, both OEMs and suppliers must invest in new equipment and capabilities. Close collaboration is essential to ensure a mutual understanding of supply chain requirements, essential components, and end products. Ideally, OEMs will offer long-term contracts to reassure suppliers that their investment will pay off. These agreements also guarantee OEMs a stable source of components.
- b. **Government & Industry Associations:** Industry bodies or associations, as well as government, must help develop a path forward for the automotive and mobility sectors. This may include creation & maintenance of incentives to encourage EV adoption; this could include offering policies that enable development of the local supply chain to reduce dependence on imports of critical components; this is especially important for EVs, since over 60 to 70 percent of their components (in value terms) are imported. Also, the R&D facilitation and ensuring liquidity through various mechanisms; for instance, the government could incentivize banks to lend money and fleet operators could partner with non-banking financial corporations to disburse loans
- c. **Mobility-Service Providers:** Mobility-service providers with small-format vehicles will gain strength in the current downturn. However, players who are dependent on four-wheelers will have to identify new business models, such as self-drive rentals and long-term lease rentals, to stimulate business. Having an extensive number of EVs in the fleet would reduce operating costs and increase drivability, which is a major factor when consumers are choosing a vehicle. It would also allow seamless integration of electronics and telematics. Mobility-service providers can collaborate with OEMs to create a path forward for the industry. Together, they could play a pivotal role in managing the downturn, embracing discontinuities, and sharing the financial and intellectual challenges involved in developing capabilities that will allow them to embrace disruptions like ACES.

8. Key Takeaways



Steps to Increase Penetration of EVs in India	Current Status in India
ICE engines to be banned by 2030	✗
Imposition of fines targets for corporate CO ₂ emissions are exceeded	✗
High Import Duties	✓
Purchase Incentives/Tax Deductions	✓
Sound Incentive Scheme	✗
Establishing Charging Infrastructure	✓
State wise End Subsidies to OEMs	✓
Economic Recovery Plan for EVs	✗
Road Tax Incentives	✓
Bonuses for Leasing	✗
Funds to Commercial Vehicle Segment	✗
Fleet Exchange Program	✗
Funds for Battery Cell Production	✗

Source: Channel Checks, eninrac research & analysis

9. About Eninrac Consulting



eninrac is a leading provider of research, analytics and advisory services for your business nestled under different industry with unique insights to stakeholders across the globe. eninrac blends extensive knowledge of all aspects of your business industry to provide unmatched analytical insights, innovative strategies, and measurable value creation. We add value with pace, certainty and strategic agility and strive to exceed client expectations by delivering consistent results. We help our clients in unlocking potential and empowering organizations to achieve business objectives and goal effectively. We at eninrac put clients at the centre of our business and transform their risks into high rewarding opportunities through our innovative solutions.



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The life of a man consists not in seeing visions and in dreaming dreams, but in active charity and in willing service

- Henry Wadsworth Longfellow

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Transformation Trends & Growth Opportunities in the Global Automotive Aftermarket

by

FROST & SULLIVAN

Transformation Trends & Growth Opportunities in the Global Automotive Aftermarket

Whitepaper
62nd ACMA Annual Summit
New Delhi



September 2022

*The Growth Pipeline™ Company
Powering clients to a future shaped by growth*

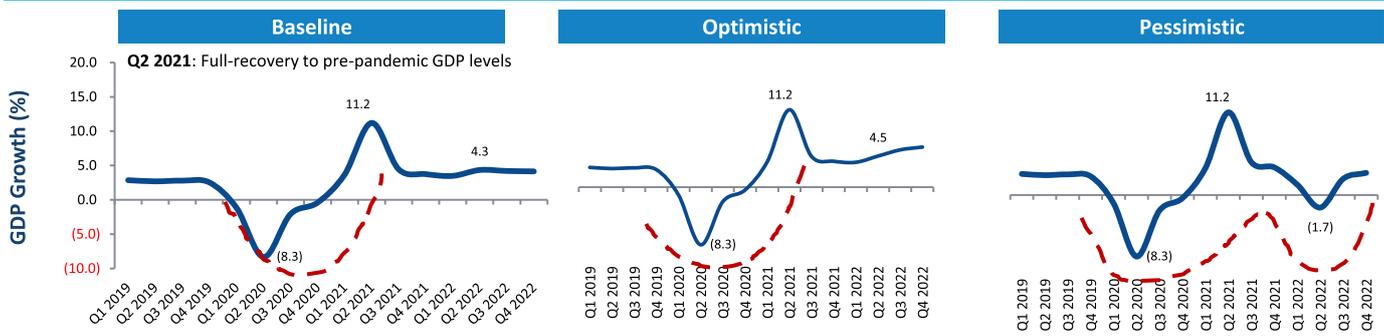
TABLE OF CONTENTS

- Global Automotive Aftermarket Overview & Trends
- Indian Automotive Aftermarket – Trends & Growth Opportunities
- ERetailing in India – High growth market driven by enhanced Connectivity across the country
- Customer Perspectives & Considerations in the Automotive Aftermarket

2022 SCENARIO ANALYSIS – QUARTERLY GLOBAL GROWTH

THE SWIFT REOPENING OF ECONOMIES, AN UPTICK IN CUSTOMER DEMAND, AND FASTER SERVICES SECTOR RECOVERY WILL ENABLE 2022 GLOBAL GDP GROWTH TO REACH 4.8% IN AN OPTIMISTIC SCENARIO. UNDER A PESSIMISTIC SCENARIO, ENTAILING THE RAPID SPREAD OF THE OMICRON AND OTHER VARIANTS, EXTENDED LOCKDOWNS, LINGERING VACCINE INEQUITY, AND A PROTRACTED RUSSO-UKRAINIAN WAR, GDP GROWTH WILL DROP TO 1.2%

GDP growth scenario analysis, global, Q1 2019 – Q4 2022



Scenario	Baseline	Optimistic	Pessimistic
Length of Recession	4 quarters in 2020	4 quarters in 2020	4 quarters in 2020 and Q2 2022 negative growth
Depth of Recession	8.3% contraction in Q2 2020	8.3% contraction in Q2 2020	Brief contraction of 1.7% in Q2 2022, following 3.1% 2020 annual recession
2022 GDP Growth	4.3%	4.8%	1.2%

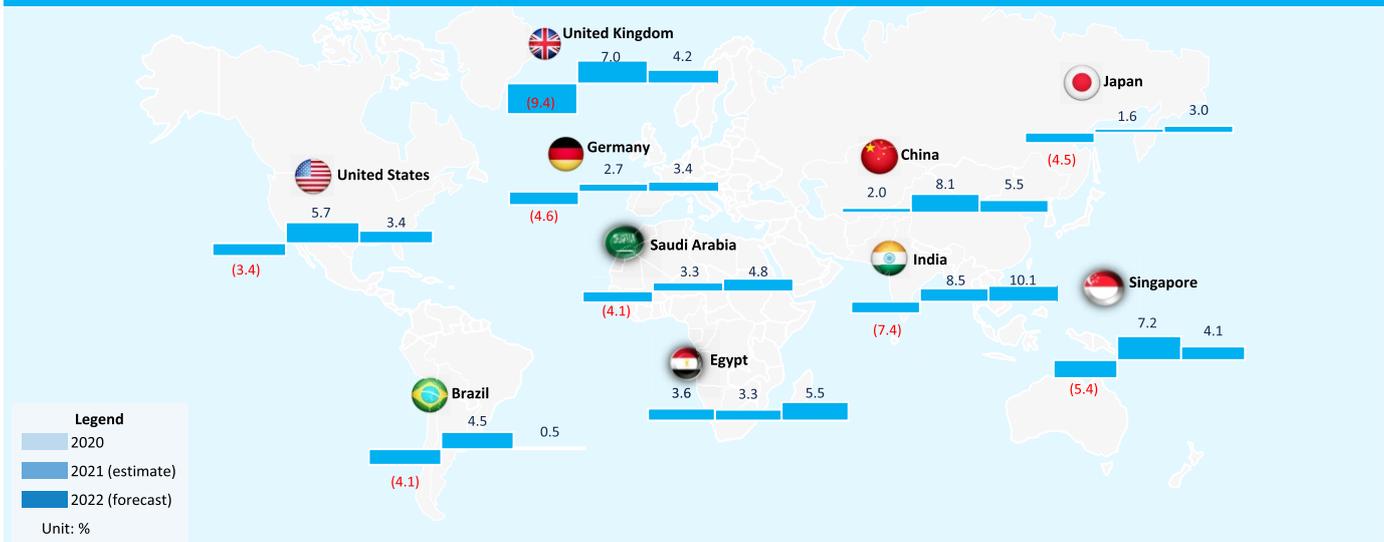
Note: Analysis is up to date as of 1 March 2022. Negative data is in maroon. Quarterly GDP growth calculations based on the same quarter of the previous year. Estimates start from Q4 2021.

Source: IMF; World Bank; Frost & Sullivan

2022 GLOBAL GDP GROWTH SNAPSHOT

GDP GROWTH RATES FOR 2022 INDICATE SIGNS OF NORMALIZATION, FOLLOWING THE BASE EFFECT DRIVING EXTRAORDINARY 2021 GROWTH LEVELS. SEVERAL MAJOR ECONOMIES REPORTED A DOWNWARD REVISION IN 2021 AND 2022 GROWTH RATES FROM THE FORECASTS MADE IN SEPTEMBER 2021, INDICATING A MORE SUBDUED ECONOMIC ENVIRONMENT

GDP Growth Rate, Selected Economies, 2020–2022



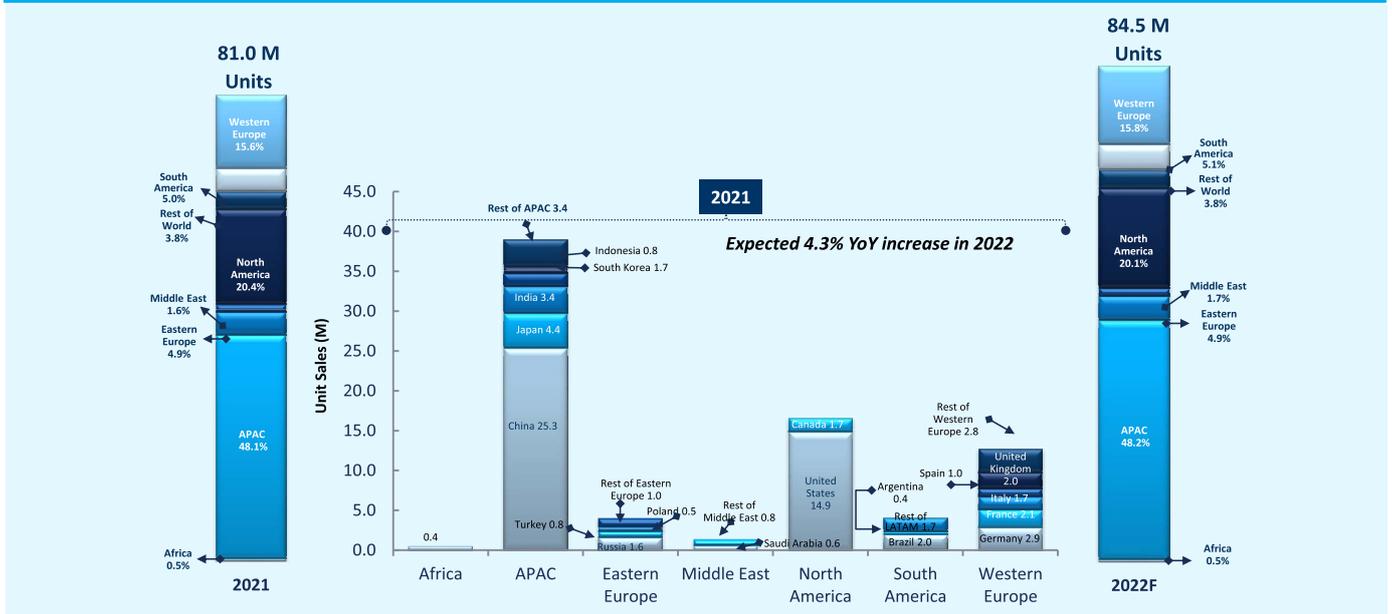
Note: Analysis is up to date as of or prior to 8 February 2022, except for the United States, the United Kingdom, and Germany that are as of 1 March 2022 on account of the Russo-Ukrainian War. Negative data is in maroon. Forecasts pertain to the baseline scenario. Data for India and Egypt are for fiscal years. For example, India's 2020 data refers to fiscal year April 2020 to March 2021; Egypt's 2020 data refers to fiscal year July 2019 to June 2020.

Source: IMF; US Bureau of Economic Analysis (BEA); UK Office for National Statistics (ONS); Federal Statistical Office (Germany); Brazilian Institute of Geography and Statistics; General Authority for Statistics (Saudi Arabia); Central Agency for Public Monetization and Statistics (Egypt); National Bureau of Statistics (China); Reserve Bank of India; Statistics Bureau (Japan); Singapore Department of Statistics; Frost & Sullivan

GLOBAL LV SALES BY REGION IN 2021 AND 2022 – SNAPSHOT

CUSTOMER CONFIDENCE AND LOW INTEREST RATES LED TO STRONG DEMAND FOR PASSENGER VEHICLES IN 2021, WITH 2022 LOOKING MORE POSITIVE.

Automotive market: LV sales, global*, 2021 and 2022F



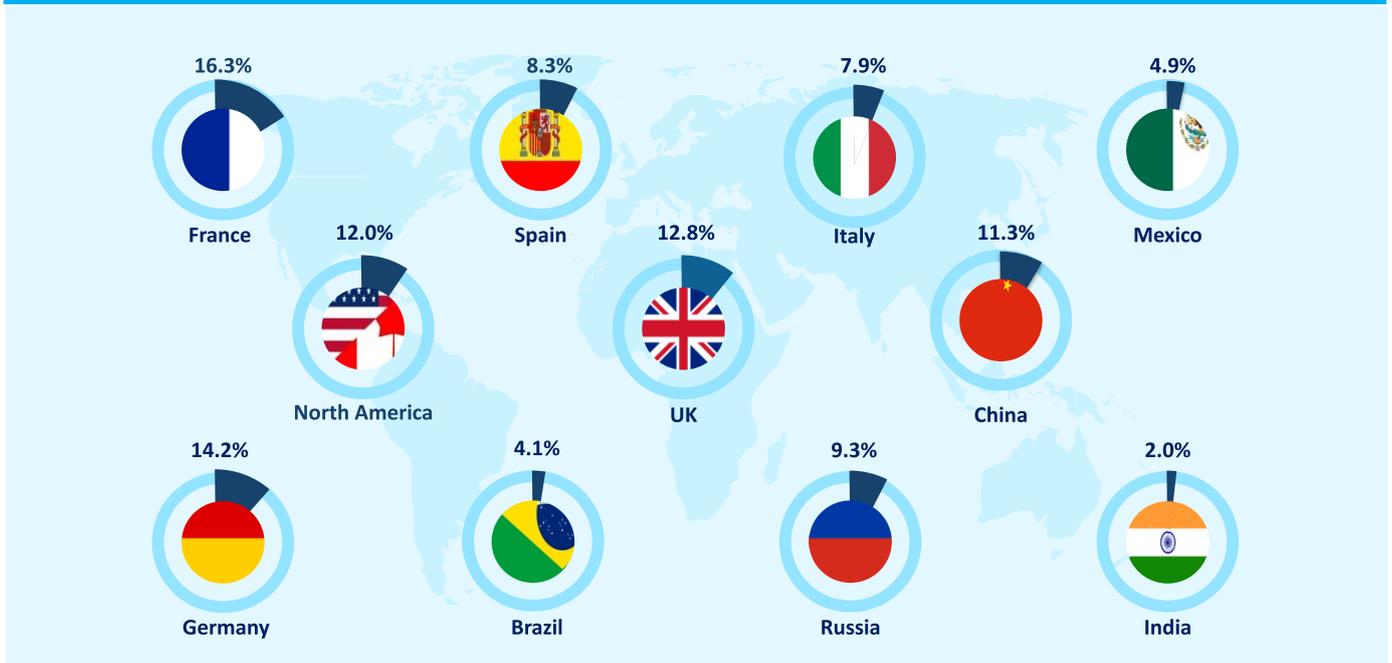
*LVs include PVs and LCVs with a gross vehicle weight rating (GVWR) of up to 7.5 metric tons (MT) depending on regions.
 *Sales data from respective automotive associations of countries might vary because of the difference in reporting structure.
 *Rest of World breakdowns are not available.
 * APAC = Asia-Pacific; LATAM = Latin America; PV = Passenger Vehicle; LCV = Light Commercial Vehicle

Source: Frost & Sullivan

GLOBAL AFTERMARKET ERETAILING PENETRATION – 2026 EXPECTATIONS

GROWTH OF PENETRATION IN SOME DEVELOPING MARKETS IS HAMPERED BY THE LARGELY FRAGMENTED NATURE AND INEFFICIENCIES IN CATALOGING.

eRetailing in automotive aftermarket: automotive aftermarket etailing penetration, global, 2026

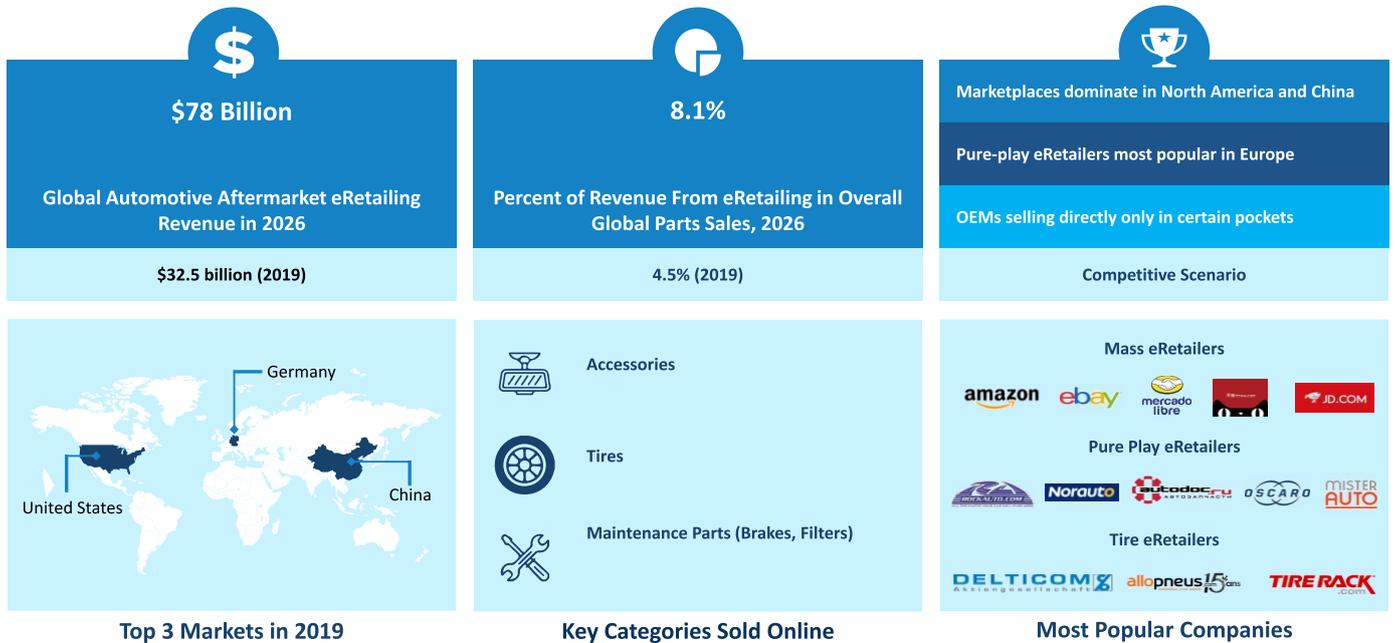


Source: Frost & Sullivan

GLOBAL AFTERMARKET – ERETAILING OPPORTUNITIES DASHBOARD

US, CHINA, AND GERMANY ARE THE TOP MARKETS FOR SELLING REPLACEMENT PARTS AND ACCESSORIES ONLINE.

eRetailing in Automotive Aftermarket: Aftermarket Snapshot, Global, 2019 – 2026

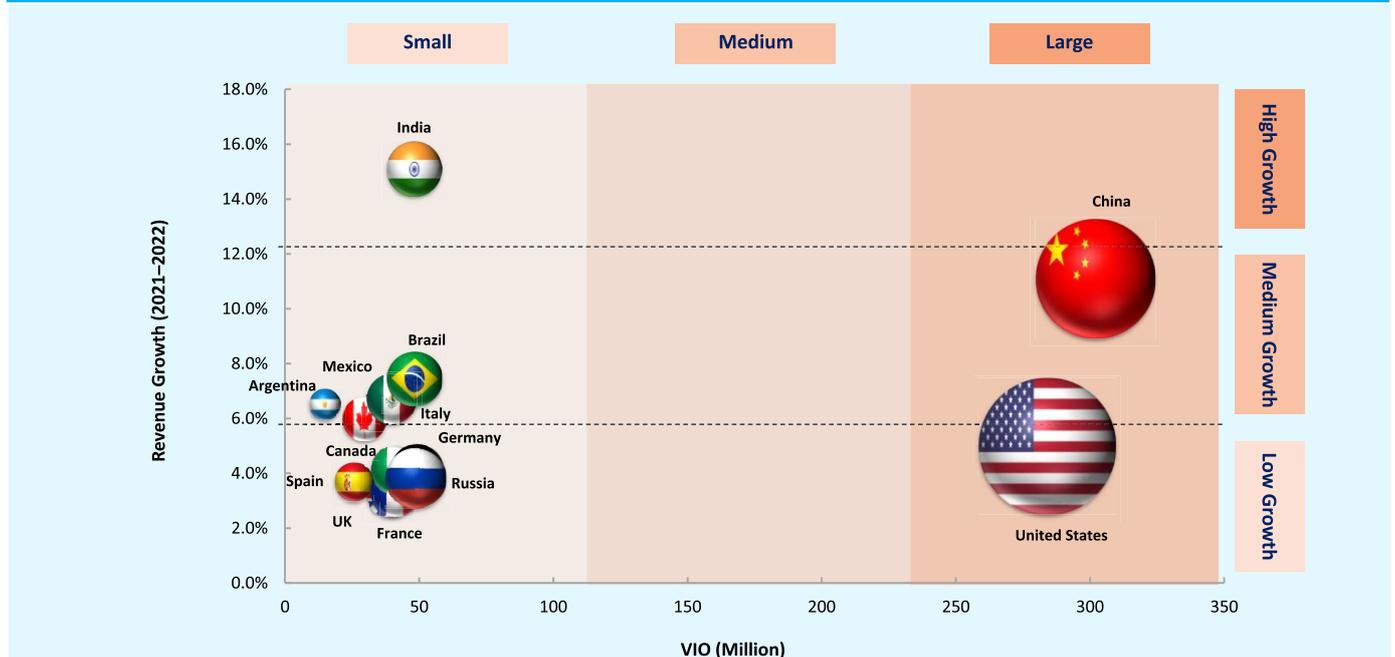


Source: Frost & Sullivan

GROWTH OPPORTUNITY BY COUNTRY – INDIA SHOWS HIGHEST GROWTH

CHINA'S GROWTH CAN BE CHECKED BY THE IMPLICATIONS OF THE COUNTRY'S STRINGENT ZERO-COVID POLICY ON PERSONAL MOBILITY DURING 2022.

Automotive aftermarket: Regional growth opportunity analysis, key countries, 2021–2022



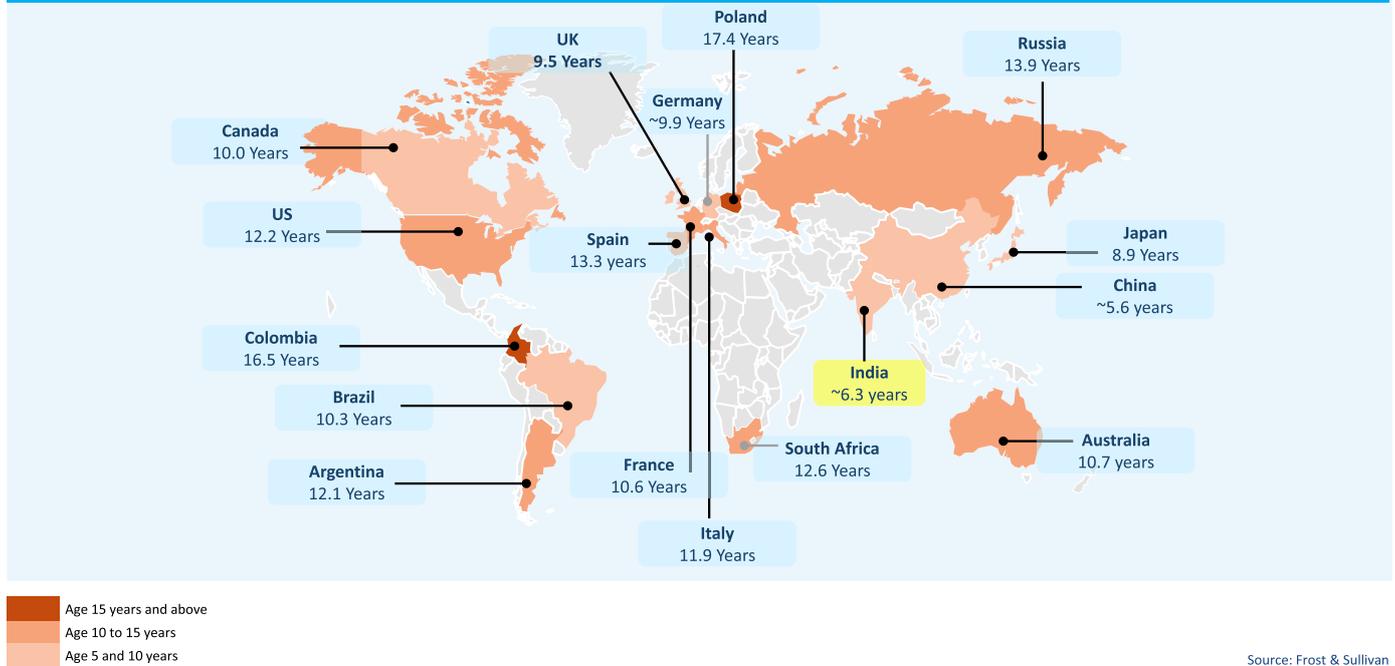
Size of the bubble is representative of the regional aftermarket revenue in 2021.

Note: All figures are rounded. The base year is 2021. Source: Frost & Sullivan

AVERAGE VEHICLE AGE – INDIA HAS THE YOUNGEST FLEET AFTER CHINA

Globally, the aging vehicle population augurs well for IAM service providers

Automotive aftermarket: Average vehicle age, global, 2022



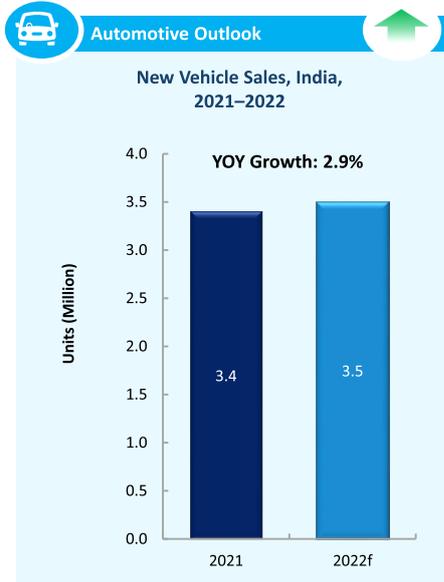
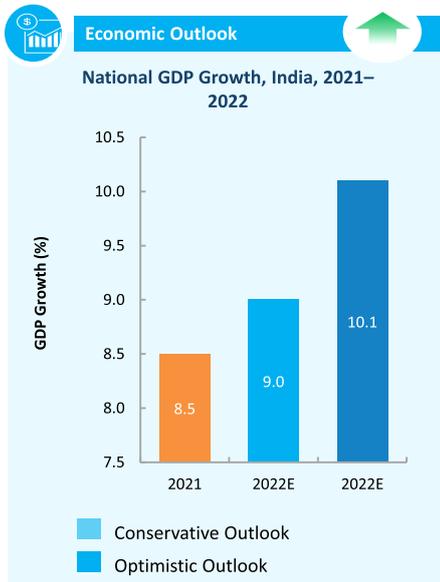
Source: Frost & Sullivan

TABLE OF CONTENTS

- Global Automotive Aftermarket Overview & Trends
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REGIONAL AUTOMOTIVE OUTLOOK — INDIA SNAPSHOT

REGULATORY EVOLUTION AND THE DEMAND FROM CUSTOMERS TO SEE INCREASED TECHNOLOGY PENETRATION EXPECTED TO DRIVE INVESTMENTS IN CONNECTED, SHARED AND ELECTRIFICATION TECHNOLOGIES IN INDIA ACROSS PASSENGER VEHICLE SEGMENTS.



Aftermarket Impact

- **New vehicle sales growth is limited due to production issues** related to the shortage of semiconductors.
- On the other hand, the **auto components industry in 2021 saw considerable growth, domestically and internationally.**
- **Enhanced localization in new vehicle sales** is a general trend across OEMs, promoting local production and supply to the aftermarket.
- While **future waves of the pandemic are not ruled out**, the country shows signs of opening up in 2022.

⬇️ Negative Outlook
 ⬆️ Neutral Outlook
 ⬆️ Positive Outlook

Source: IMF; Frost & Sullivan

INDIAN AUTOMOTIVE AFTERMARKET DASHBOARD

INDIAN AUTOMOTIVE AFTERMARKET DRIVEN BY INVESTMENTS IN DIGITISATION AND BRIDGING OF THE GAP BETWEEN OE AUTHORISED SERVICE CENTRES AND INDEPENDENT GARAGES

Automotive Aftermarket: Aftermarket Dashboard, India, 2021–2022



Top 3 Influencers

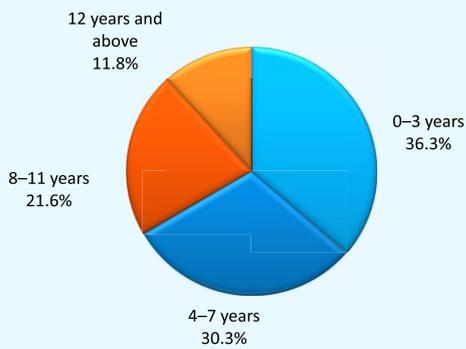
- 1 With a vast majority of the services industry opting to deploy a **hybrid working model** in 2022, the average annual vehicle mileage is expected to cross pre-pandemic levels.
- 2 Introduction of the **Production Linked Incentive Scheme** will encourage local investments, enhancing parts availability in the local market at competitive prices.
- 3 Launch of new EV models is forecast to boost already positive EV sales and potentially boost demand for EV-specific services like charging solutions and diagnostics services.

Source: Frost & Sullivan

VIO OWNERSHIP PATTERN IN INDIA

ALTHOUGH THE AVERAGE AGE OF VEHICLES IN INDIA RELATIVELY LOW ON THE GLOBAL SCALE, THERE IS A SIGNIFICANT GROWTH IN THE SHARE OF VEHICLES IN THE 4-11 YEARS GROUP. CONSEQUENTLY THE PROPENSITY OF CUSTOMERS TO LEVERAGE THE INDEPENDENT SERVICE INFRASTRUCTURE IS HIGH, DRIVING REVENUES IN THIS SEGMENT.

Automotive Aftermarket: VIO Age**, India, 2021



Aftermarket Opportunity



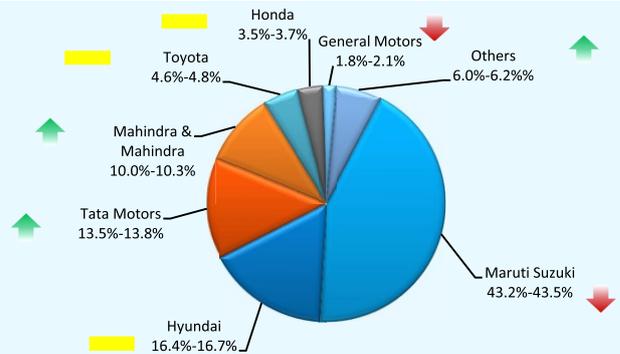
Share of vehicles between 4 and 11 years is expanding, augmenting IAM demand

**VIO by age only corresponds to passenger vehicles.

*Others include MG, Kia, Isuzu, VW, Ford, and Jeep.

Key: Half circle under the aftermarket opportunity is the total potential; the blue-shaded portion represents immediate impact.

Automotive Aftermarket: VIO Brand Share, India, 2021



Hyundai, Tata, and M&M are expanding their share in the vehicle parc, opening up room for multi-brand servicing

Decreasing Stable Increasing

Note: All figures are rounded. The base year is 2021. Source: Frost & Sullivan

PASSENGER VEHICLES IN INDIA – 5 YEAR OUTLOOK LOOKS PROMISING

THE INDIAN AUTOMOTIVE INDUSTRY IS DRIVING INTO 2022 WITH A POSITIVE MINDSET IN ITS QUEST TO REACH THE PRE-PANDEMIC LEVELS OF SALES VOLUME. PASSENGER CAR MARKET WAS VALUED AT USD 32.70 BILLION IN 2021, AND IT IS EXPECTED TO REACH A VALUE OF USD 54.84 BILLION BY 2027

Passenger Vehicle Industry: Market Trends, India, FY17 - FY27



Production/Imports Trend:

- OEMs faced production loss due to shortage of semi-conductors and high input costs
- Alongside the uncertainties connected with the Omicron variant, State governments had imposed partial or full lockdown, thus affecting production in month of April and May

Domestic Sales Trend:

- Domestic sales grew at a modest CAGR of 2.9% during FY17 - FY20.
- Indian Passenger Vehicle Industry went through one of the toughest times in FY'21.
- However; there was a spurt in economic recovery during the festive season and cars sales picked up strongly. It can be rightly said that the Industry saw a V-shaped recovery.

Export Trend:

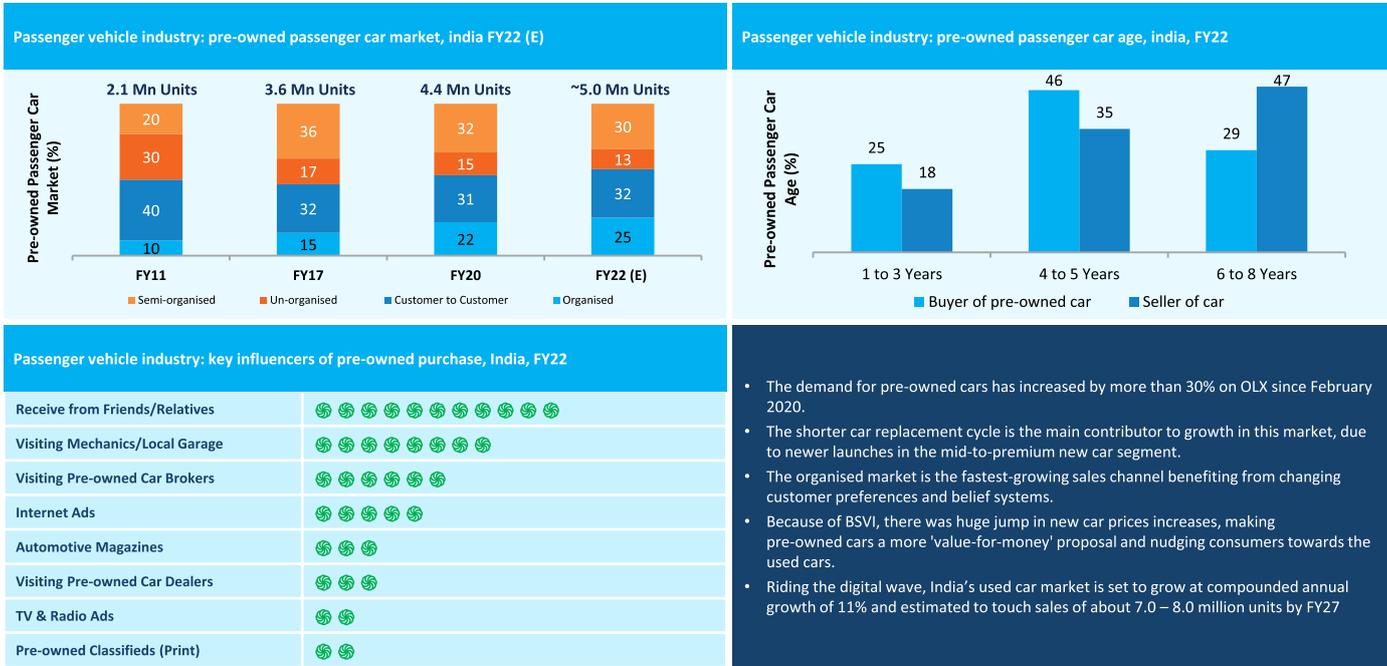
In the last fiscal year, passenger car exports saw a modest increase, with Maruti Suzuki leading the segment closely followed by Hyundai and Kia in the second and third positions respectively.

Total volume sales include hard and soft top Van numbers. FY : Financial Year in India is from April to March

Source: SIAM, Frost & Sullivan

TREND 1 – NO SLOWDOWN IN PRE-OWNED CAR MARKET

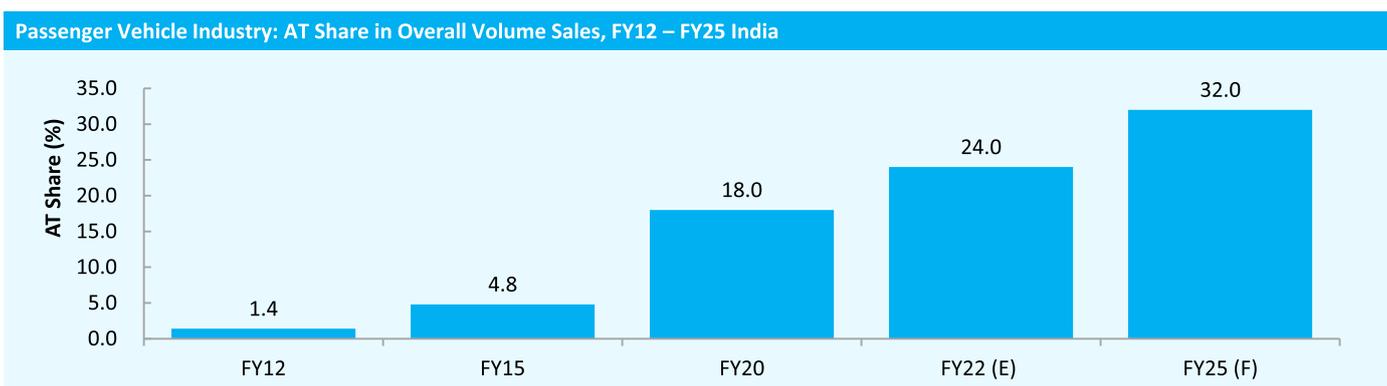
USED CAR MARKET GROWTH IS DRIVEN BY INCREASED SALES OF USED CARS IN METRO AND MAJOR CITIES AND A RISE IN ONLINE PLATFORM SALES SUCH AS CARDEKHO, CARS 24 AND DROOM. START-UPS LIKE DROOM, CARDEKHO AND SPINNY – JOINT THE UNICORN CLUB IN YEAR 2021



Source: Indian Bluebook, Frost & Sullivan

TREND 2 – RISE OF AUTOMATIC TRANSMISSIONS (AT) IN CARS

AUTOMATIC TRANSMISSION PENETRATION STANDS NEARLY 22 - 24% IN FY22. NEARLY ONE OUT OF EVERY FIVE CARS SOLD IN THE LOCAL MARKET TODAY COMES STRAPPED WITH AUTOMATIC TRANSMISSION, AS INDIANS INCREASINGLY OPT FOR VEHICLES THAT ARE EASIER TO DRIVE IN CONGESTED CITIES



- From just 4.8% in FY14, automatic gearbox cars today make up about 24% of the industry. The reasons for this incremental change are factors such as affordability, traffic congestion, and consumers choosing comfort features such as an automatic gearbox over other accessories.
- Increased preference for automatic cars is seen among women and senior citizens.
- Due to traffic congestion in urban areas, this change is now occurring even in sub INR 1 Mn vehicles. The ease of driving is a big purchasing consideration. Apart from it, driving is more comfortable in an automatic vehicle than it is in a manual vehicle.

Source: Frost & Sullivan

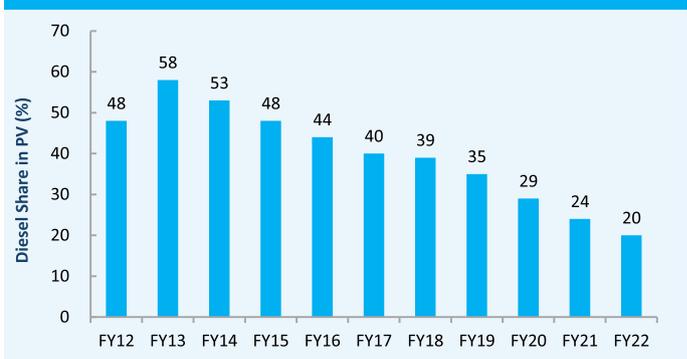
TREND 3 – DECLINING PETROL - DIESEL PRICE GAP BOOSTS SHIFT TO PETROL/CNG CARS

THE BSVI IS ACCELERATING THE SHIFT TOWARDS PETROL VEHICLES WHILE THE FUEL PRICE GAP BETWEEN PETROL AND DIESEL VEHICLES IS NARROWING.

Price* Differential Petrol Vs. Diesel, India, FY12 - FY22



Passenger Vehicle Industry: Declining Diesel Share in PV, India, FY12 - FY22



- After April 2012, a frequent monthly rise in the retail price of diesel (Delhi ₹65.6/ litre) has substantially reduced the retail price difference between petrol and diesel fuel, leading to the cost-effectiveness of owning a diesel PV that is comparatively less favorable than in the past. The share of diesel vehicles has already decreased from 58% in FY2013 to 20% in FY22, and it will decrease further to approximately 17% by 2027.
- The upfront price differential of the petrol and diesel model has increased by ₹ 50,000 to ₹ 100,000 following the implementation of BSVI in April 2020, which accelerates the shift towards petrol vehicles along with the narrowing fuel price gap between petrol and diesel.
- In the medium-to-long term, the regulatory drive to ban older diesel vehicles and to push for CNG in the commercial taxi segment will restrain diesel vehicle demand.

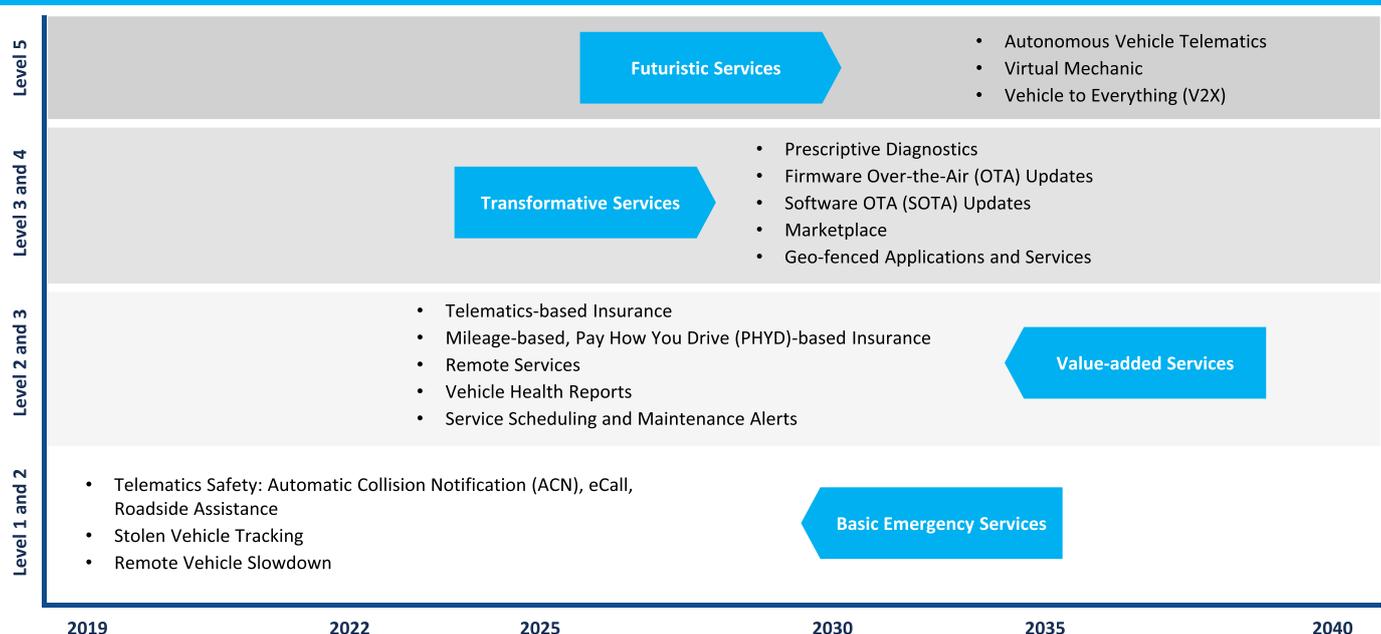
*Fuel prices are for New Delhi.

Source: Frost & Sullivan

TREND 4 – CONNECTIVITY BECOMES USP AND DIFFERENTIATOR FOR OEMS

TRANSFORMATIVE SERVICES, WHICH ARE PRIMARILY CENTERED ON TELEMATICS-BASED INSURANCE, REMOTE SERVICES, AND VEHICLE HEALTH REPORTS, WILL BECOME THE KEY FOCUS AREAS FOR OEMS IN INDIA FOR THE NEXT 3 TO 5 YEARS

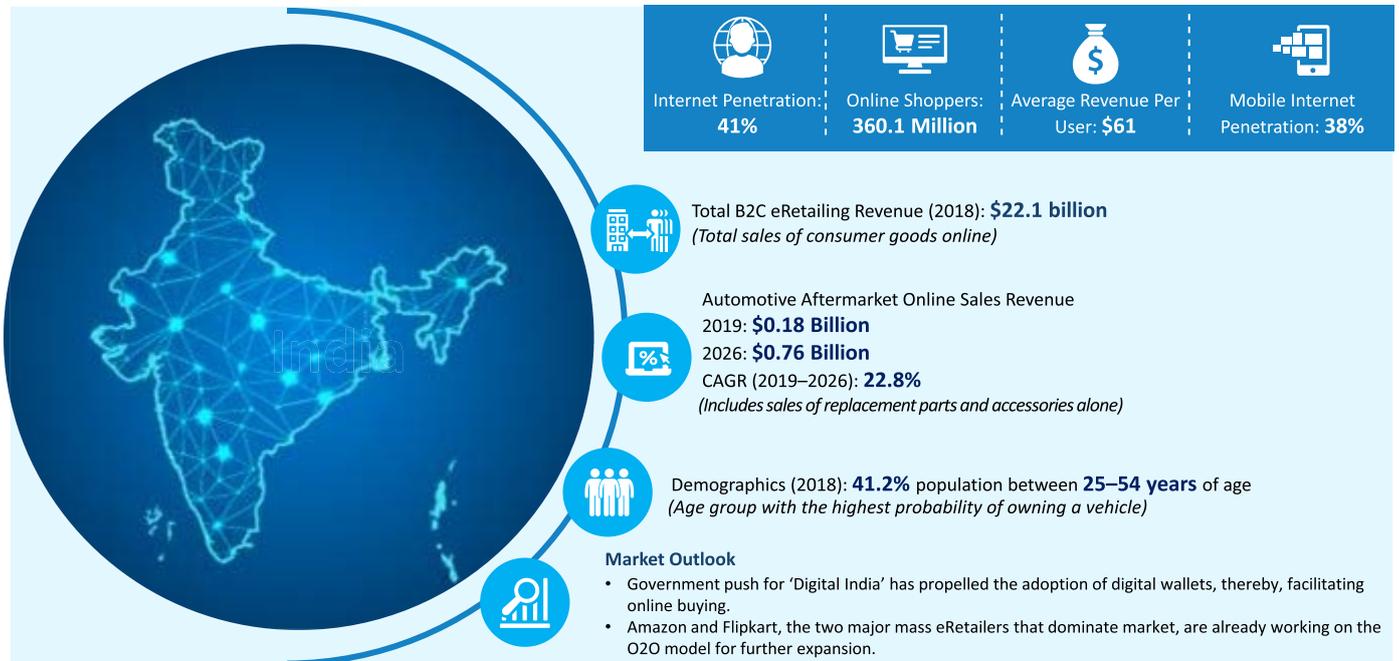
Passenger vehicle industry: connectivity roadmap, India, FY19 - FY40



Source: Frost & Sullivan

TREND 5 – ERETAILING IN INDIA DRIVEN BY MOBILE CONNECTIVITY

WHILE A LARGE SHARE OF ONLINE BUYERS IS THE SIGNIFICANTLY SIZED MIDDLE CLASS, THE SUCCESS OF ECOMMERCE ALSO HINGES ON THE GROWTH OF MOBILE INTERNET PENETRATION



NOTE: Internet penetration refers to the percent of Internet users as a percent of the total population

Source: Central Intelligence Agency; eMarketer; We are Social; Frost & Sullivan

AUTOMOTIVE 5G USE CASES

5G IS LIKELY TO BECOME THE BACKBONE OF INTERNET OF THINGS (IOT) ECOSYSTEMS, LINKING NUMEROUS CONNECTED DEVICES AND MACHINES SUCH AS FIXED AND MOBILE DEVICES, SMART CITY INFRASTRUCTURE, AND CARS—ESTABLISHING A NEW INDUSTRIAL AND ECONOMIC REVOLUTION

Passenger Vehicle Industry: Automotive 5G Use Cases, Global, FY22

BANDWIDTH REQ. INDEX	>2Gbps	Virtual Reality	HD Multimedia Streaming	HD Sensor Data Sharing	Complex V2V Interactions	Autonomous DRT	Intelligent Transport system	AR/VR-based Gaming (rear seat)	Robo-Taxis
	100M-1Gbps	FOTA Updates	Off-board Digital Assistants	Truck Platooning	Edge Computing Analytics	Smart Parking	Cooperative Mobility	Autonomous Shuttles (controlled environment)	On-demand Contextual Services
	10-100Mbps	Prognostics	HD Navigation	RTTI	Cloud Compute/Storage	Massive Public Surveillance			
	<10Mbps	SOTA Updates	Cloud Compute/Storage	Tele-Operated Driving	Intersection Assist	Automated Valet Parking (Controlled Environment)	Multi-modal Transport App	Dynamic Vehicle Positioning	Real-time Route Planning
		Fleet Management	Car Infotainment	Local Hazard Warning					
		Usage-based Insurance	Vehicle Diagnostics			Toll & Auto Payments		Mobility Bookings	
		eCall	On-board Digital Assistants					Mobility Payments	
		Connectivity		Autonomous Vehicles		Smart City		Shared Mobility	

Latency Index ● Low latency (50-100ms) ● Very low latency (10-30ms)
 Frequency of data transfer ● Low ● Medium ● High
 5G Opportunity

Source: Frost & Sullivan

TABLE OF CONTENTS

- Global Automotive Aftermarket Overview & Trends
- Indian Automotive Aftermarket – Trends & Growth Opportunities
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A FAST GROWING INDIAN ECOMMERCE AFTERMARKET (CAGR 22.5%)

PANDEMIC HAS ACCELERATED THE INDIAN E-COMMERCE INDUSTRY BY A DECADE, REVOLUTIONIZING THE OPERATIONS, BUSINESS MODEL, AND CUSTOMER SHOPPING EXPERIENCE, ALSO SEVERELY IMPACTING THE AFTERMARKET

Aftermarket Ecommerce, Spare Parts (FY21–25)	Core Assumptions	Analysis															
	<ul style="list-style-type: none"> 3–4% of total Indian ecommerce market is auto components market In the total Indian aftermarket, currently 1% of all products are sold via eCommerce channels 	<ul style="list-style-type: none"> Companies in auto components ecommerce are creating an Omni-channel presence Blending e-retail and offline retail to overcome trust issues of customers (GoMechanic) Leading e-tailers in India are planning to open brick-and-mortar stores. Boodmo plans to open self-pickup points at Kashmiri gate, Delhi Auto e-tailers are investing in private labels to capture fast moving components market GoMechanic private label “GoMechanic SPARES” and its products SMARTCOOL coolant and many others SpareHubs private label “Fröhlich Parts” 															
	<p>Core assumptions: development of customer orders</p> <table border="1"> <thead> <tr> <th></th> <th></th> <th>2020</th> <th>2025</th> </tr> </thead> <tbody> <tr> <td rowspan="2">B2C</td> <td>Every day order</td> <td>800–1,000</td> <td>3,000–4,000</td> </tr> <tr> <td>Unique visitors per month</td> <td>10–12 Lakh</td> <td>18–20 Lakh</td> </tr> <tr> <td>B2B</td> <td>Every day order</td> <td>550–650</td> <td>5,000–6,000</td> </tr> </tbody> </table>			2020	2025	B2C	Every day order	800–1,000	3,000–4,000	Unique visitors per month	10–12 Lakh	18–20 Lakh	B2B	Every day order	550–650	5,000–6,000	
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B2C	Every day order	800–1,000	3,000–4,000														
	Unique visitors per month	10–12 Lakh	18–20 Lakh														
B2B	Every day order	550–650	5,000–6,000														

Key Implication While the baseline of the Indian Aftermarket that is facilitated via eCommerce is still nascent, an exponential ramp up can be expected, as growth rates are to accelerate by 2025

Source: Frost & Sullivan

DIGITAL POINTS OF SALE IN AUTOMOTIVE AFTERMARKET ERETAILING

IN-CAR PLATFORMS, ON-DEMAND SERVICES, AND SERVICE MARKETPLACES WILL EMERGE AS VIABLE SALES CHANNELS IN THE NEXT 5 TO 10 YEARS.

eRetailing in automotive aftermarket: Digital point of sale, global, 2019–2026



Source: Frost & Sullivan

THE INDIAN AFTERMARKET IS RAPIDLY EVOLVING FROM A LOW BASE OF € 70 MN

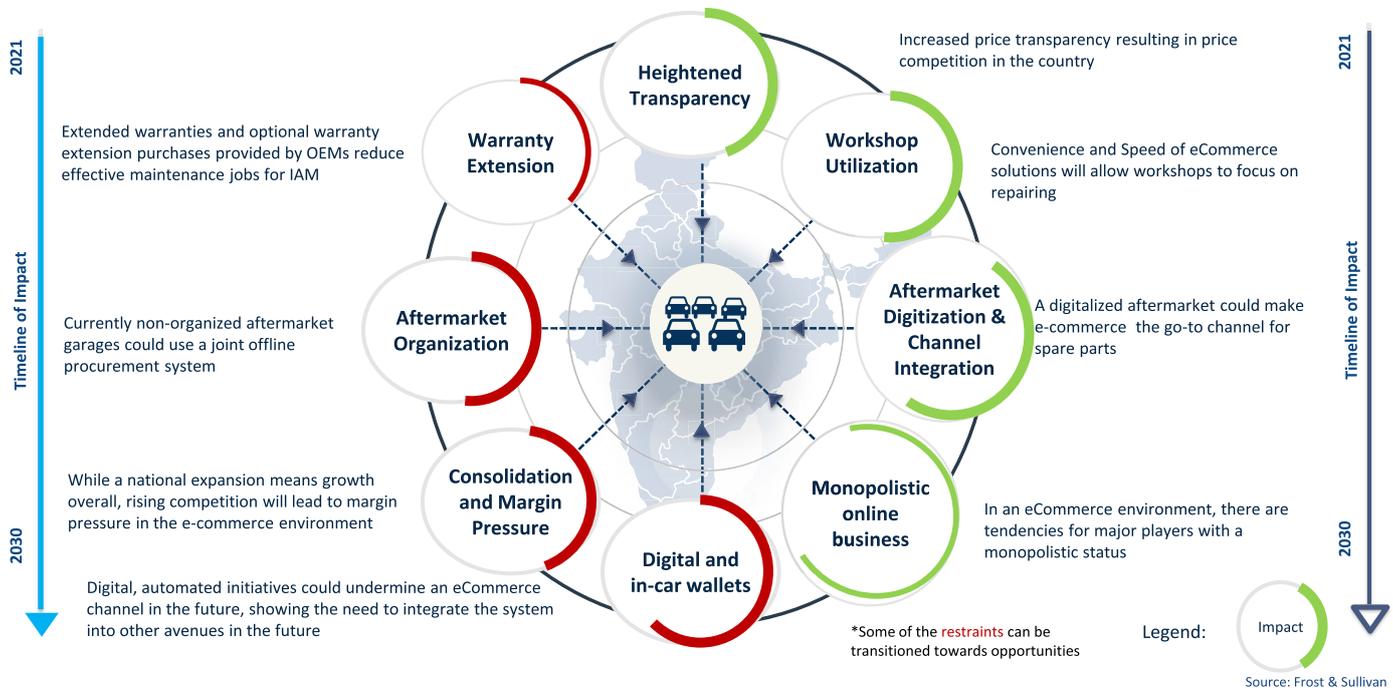
E-COMMERCE PLATFORMS BRINING TOGETHER COMPONENT MANUFACTURERS ALONG WITH SERVICE PROVIDERS ARE EXPECTED TO BRIDGE THE GAP BETWEEN EXPECTATIONS AND AVAILABILITY IN THE AFTERMARKET, FOR CUSTOMERS TO CHOOSE FROM.

<p>1 Competitive Environment</p>	<ul style="list-style-type: none"> Most relevant players include Boodmo, GoMechanic, Autokartz and Spareshub In the B2C space, E-Commerce giants like Amazon can become very competitive B2C-centric providers start focusing the garage segment, showing potential of that market Competition has slightly different business models that seem sustainable, but are not yet
<p>2 Market Size</p>	<ul style="list-style-type: none"> Core Trends driving eCommerce include Accessibility, Transparency and Convenience Barriers are OEM initiatives, aftermarket organization and other digital channels 1% of the Indian aftermarket worth € 7 bn is facilitated via eCommerce channels Mostly frequently used purchased part clusters depend on B2B* or B2C customers
<p>3 Relevance for Industry</p>	<ul style="list-style-type: none"> Suppliers: All suppliers interviewed showed severe interest and have eCommerce plans Distributors: Large regional coverage and Access to large product portfolio Garages expect to use eCommerce platforms more frequently in the future End Customers: Genuine/Original parts over spurious or local parts
<p>4 Success Factors and KPIs</p>	<ul style="list-style-type: none"> Suppliers: Lead time, Spare part coverage Distributors: Regional coverage, Quality Garages: 49% issue delivery lead time, 31% return policies, 25% struggle with cataloguing End Customers: Active Pricing, Assured Aftersales, trusted parts and mobile servicing

*B2B= Garages/workshops and small retailers

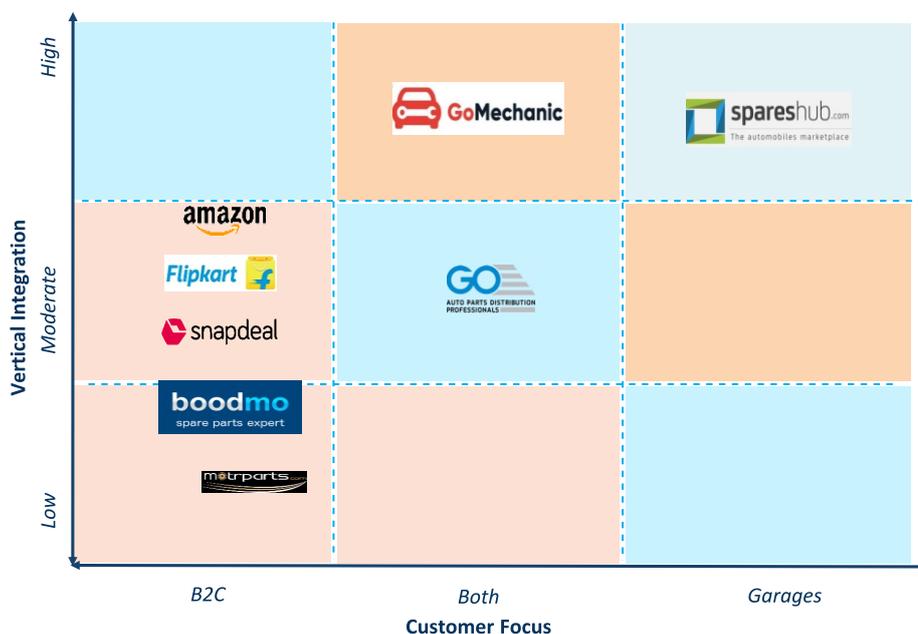
MARKET DRIVERS AND RESTRAINTS – AFTERMARKET ERETAILING ECOSYSTEM

AFTERMARKET CENTRIC DRIVERS AND RESTRAINTS EVOLVE AROUND WORKSHOPS, CUSTOMERS AND ITS VALUE CHAIN. SIGNIFICANT RESTRAINTS EVOLVE AROUND DIGITAL OEM EFFORTS THAT COULD SUBSTITUTE A SIMPLISTIC E-COMMERCE MODEL MAINLY SUPPORTING THE IAM



ERETAILING MARKET OVERVIEW: ECOSYSTEM OF PLAYERS

FLIPKART SAW A 1.7X GROWTH IN SALES CATEGORY AND 2X IN UNITS FOR AUTO COMPONENTS; 75% OF THE CONSUMERS BUYING THESE PRODUCTS WERE MALE AND ABOUT 80% OF THESE WERE IN THE AGE BRACKET OF 15–35 YEARS



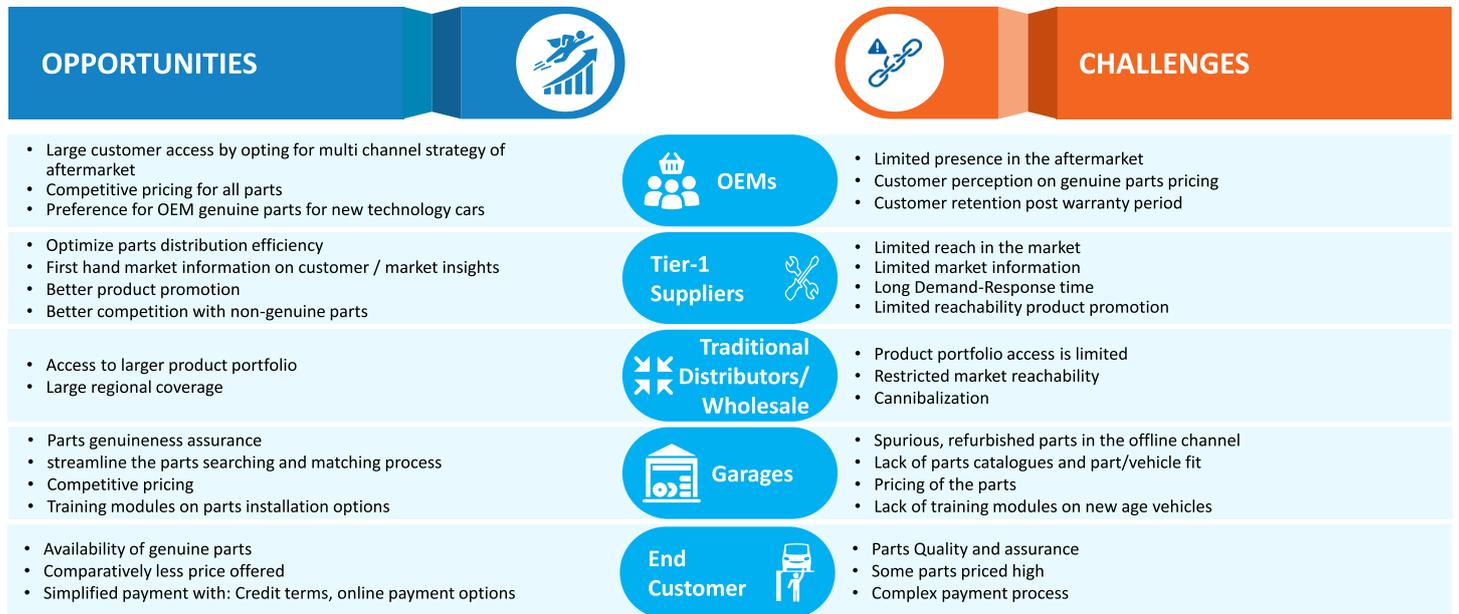
Description

- Pure ecommerce players**
 - In 2019, Flipkart saw a 1.7X growth in sales category and 2X in units for auto components
- B2B Centric Solutions**
 - SparesHub provides genuine car parts to workshops at 20% lower prices than retail stores; with 3 hrs. delivery time in selected parts
- B2C Centric Solutions**
 - Till 2020 Boodmo have served 1 Lakh+ customer with 40% of them returned for 2nd purchase
- Both B2C & B2B Centric Solutions**
 - GoMechanic, Hybrid approach with combination of offline retailers, workshops and e-tailing platform with a complete ecosystem

Source: Frost & Sullivan, ET, Boodmo

AFTERMARKET ERETAILING: OPPS AND CHALLENGES FOR NEW ENTRANTS

LIMITED REACH AND TRANSPARENCY ARE MAJOR CHALLENGES FACED BY OEMS AND TIER-1 SUPPLIERS IN THE TRADITIONAL OFFLINE CHANNEL, MAKING ACCESS TO MARKET INSIGHTS AND LESS DEPENDENCE FROM INDIRECT CHANNELS AN INTERESTING OPTION



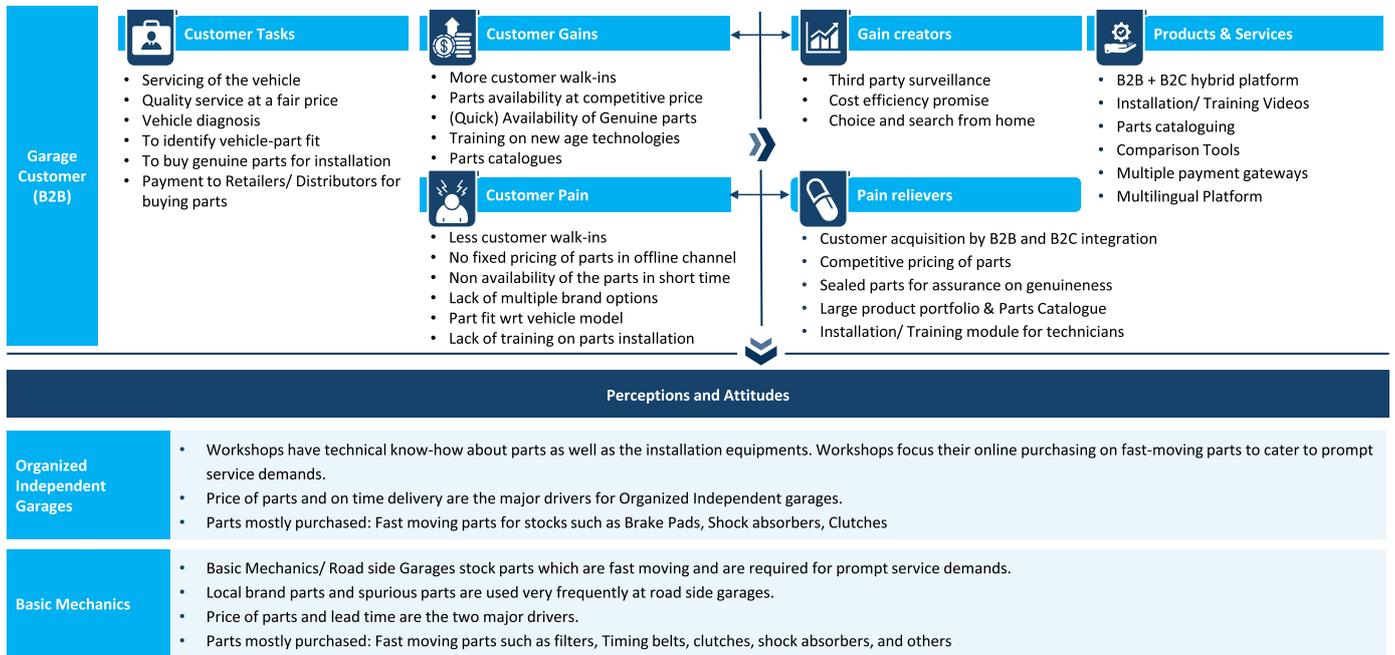
Source: Frost & Sullivan

TABLE OF CONTENTS



CUSTOMER PERSPECTIVES: DETERMINANTS OF GARAGE CHOICE

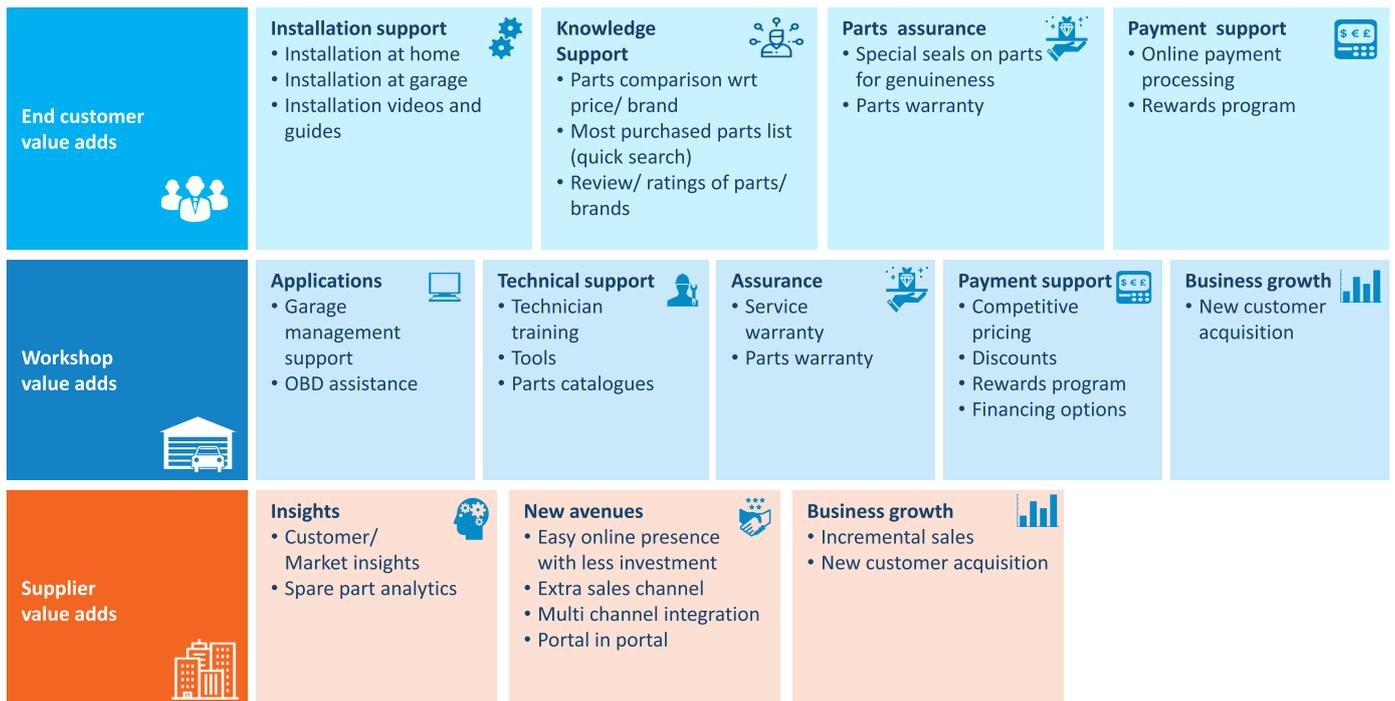
WORKSHOPS HAVE TECHNICAL KNOW-HOW TO BUY ONLINE AS WELL AS THE REQUIRED EQUIPMENT (TOOLS, LIFT, DIAGNOSTIC SYSTEMS) TO ASSEMBLE EVEN COMPLEX PARTS



Source: Frost & Sullivan

CUSTOMER EXPECTATIONS : VALUE ADDED SERVICES

VALUE ADDED SERVICES DRIVES THE SALES OF PARTS ON AN E-COMMERCE PLATFORM



Source: Frost & Sullivan

CUSTOMER USAGE AND PERCEPTIONS: EASE OF ACCESS AND AVAILABILITY KEY DRIVERS

MIX OF ONLINE AND OFFLINE PURCHASES OCCUR FOR AUTOMOTIVE SPARE PARTS. IMPLICATION: CONVENIENCE ASPECT OF ONLINE PURCHASES, ALONG WITH ITS OTHER BENEFITS, CAN BE COMMUNICATED TO BOOST STRONGER USAGE OF E-COMMERCE PLATFORM.



USAGE TRIGGERS OF E-COMMERCE PLATFORM

- **Convenience of anytime shopping (24x7)** (75%) is the **Topmost** factor that triggered the usage of E-Commerce platform
- Other key drivers include
 - Time saving, as it takes less time to evaluate, compare and select (52%)
 - Easy availability (always online, minimal down time) (47%)
 - On time delivery (42%)
 - Availability of relevant product related information (41%)

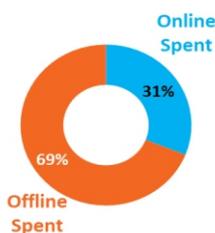


PURCHASE PROCESS OF AUTOMOTIVE SPARE PARTS

- **All end users conduct a mix of online and offline purchases of automotive spare parts.**
- **Accessories and Safety & Ergo (53%) and Lighting & Glass (46%)** are the key categories of spare parts purchased online in past 3 years.
- Online purchases of spare parts have taken place **thrice, on average, in past 3 years..**
- All respondents can track the shipment of online orders, primarily through live tracking service (71%).
- 80% got warranty offers on online purchases. Most offers vary between 6 months to 1 year (54%). However, 47% mentioned that they did not bother about warranty offers as the price was quite low.
- 71% purchases the automotive spare parts from an E-commerce platform and get them fitted from a garage and 64% intend to continue this pattern in future. However, this behaviour is more predominant within the PV owners. Within CV owners fitment from a garage is little lower (61%) and in future they intend to do fitment in garage (45%), as well as on their own (42%).

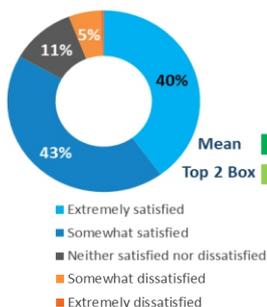
INCREASING TRUST IN DIGITAL PAYMENT DRIVING E-RETAILING IN RURAL INDIA

PROPORTION OF ONLINE SPENT IS LOW BUT USERS OF ONLINE PLATFORM ARE CONSIDERABLY SATISFIED WITH ONLINE PURCHASES AND WISH TO CONTINUE USAGE AND RECOMMEND TO OTHERS. IMPLICATION: SATISFIED CONSUMERS CAN ENDORSE THE PLATFORM TO DRIVE LARGER USAGE



PAYMENT FOR ONLINE TRANSACTIONS

- **A total of INR 15,043 (on average), has been spent in past 3 years in purchasing automotive spare parts.**
- **31% of the total spent has gone into online purchases** of automotive spare parts in past 3 years. Online spent in past 3 years is relatively more in the categories of Accessories and Safety & Ergo (55%) and Wheels & Tyres (48%). In 2025, online spent is estimated to be low (6%-18%), across categories.
- Credit card/ Debit card (65%) and E-wallet (56%) are the top 2 modes of payment for online purchases of spare parts.
- 48% mentioned that they have not faced any problems in making online payments. There are some mentions of issues like slow processing of payments (25%), limited payment gateways (24%) and online fraud (24%).
- Only 41% received discount offers in online purchases., mainly up to 30% cash back, 10% discount etc.



POST PURCHASE EXPERIENCE

- **83% are substantially satisfied** with online purchases of automotive spare parts.
- **87% are highly willing to continue purchasing online.**
- **89% are willing to recommend online purchases** of automotive spare parts to others.

Key Trends Shaping The Indian Auto Sector

by



Grant Thornton



Key trends shaping the Indian auto sector

Submitted to

Automotive Component Manufacturers Association of India (ACMA)

September 2022



Content

Executive Summary	3
Indian auto market overview	5
Trends shaping the automotive industry	7
Key challenges faced by the sector	38

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Industry information has been obtained from various secondary sources and validated through primary research wherever possible.

All assumptions made in order to develop the report were based on information or opinions that are current. In the course of our analysis, we were provided with both written and verbal information, including limited information on the market, financial and operating data which we accepted as accurate. Nothing has come to our attention to cause us to believe that the facts and data set forth in this report are not true or correct.

List of Figures

Figure 1: Segment break-up in total production volume, FY2021-22	5
Figure 2: Automobile market in India (USD billion)	6
Figure 3: Survey on automobile buying trends	8
Figure 4: India online passenger car market size (USD billion)	9
Figure 5: Survey on auto buying behaviour in India, Auto Gear Shift India, 2020	10
Figure 6: India auto OEMs (passenger cars and 2Ws) ad spend on digital (in USD billion)	10
Figure 7: Used vehicles market in India (in USD billion)	11
Figure 8: Segment break-up in domestic sales FY2021-22	15
Figure 9: PV domestic sales	15
Figure 10: PV Domestic Sales, YTD FY2022-23	15
Figure 11: Year-on-Year (Y-o-Y) heat map for analysis of production, domestic sales and exports of PVs16	
Figure 12: Survey on what kind of car do you plan to buy	17
Figure 13: CAGR and segment-wise share of vehicles	18
Figure 14: Two-Wheeler Domestic Sales	19
Figure 15: Two-wheeler domestic sales, YTD FY2022-23	19
Figure 16: Y-o-Y heat map for analysis of production, domestic sales and exports of PVs	19
Figure 17: Projected growth of e-two-wheeler market in India	19
Figure 18: FY2022-23 Q1 sales growth for premium two-wheelers	20
Figure 19: CV domestic sales	20
Figure 20: CV domestic sales, YTD FY2022-23	20
Figure 21: CV Data- Segment Analysis for Q1FY2022-23	21
Figure 22: Y-o-Y heat map for analysis of production, domestic sales and exports of CVs	21
Figure 23: Three-wheeler domestic sales	23
Figure 24: Three-wheeler domestic sales, YTD FY2022-23	23
Figure 25: Y-o-Y heat map for analysis of production, domestic sales and exports of three-wheelers	23
Figure 26: India's EV Market Volume ('000)	25
Figure 27: Vehicle category-wise market share (Cumulative till FY2021-22)	25
Figure 28: State-wise Registered EV Cumulative Sales (till FY2021-22)	26
Figure 29: FY 2021-22 EV sales for passenger vehicles (in millions)	29
Figure 30: Technological evolution of solutions and their use-cases in India	32
Figure 31: Telematics market size in India (INR million)	33
Figure 32: Dominance of commercial vehicle segment in Indian telematics market	34
Figure 33: Telematics offerings in CV segment in India	35
Figure 34: Telematics ecosystem in India	36
Figure 35: Comparison of connected cars volumes between 2019 and 2023	39

Executive summary

Indian automotive industry, which is the world's fourth largest and globally one of the most competitive industries, witnessed an annual production of 23 million vehicles in the financial year (FY) 2021-22. The two-wheeler segment dominates the market in terms of production volume. The Indian auto industry, however, has been witnessing testing times over the past few years and COVID-19 has proven to be a litmus test. The pandemic had a severe impact on the industry, with vehicle sales hitting the lowest. From launching new models and implementing social distancing norms in factories to going digital in a bid to enable hassle-free purchase, auto companies have been trying to mitigate the effects of COVID-19. Despite a sluggish market environment in FY2020-21, the overall automobile exports have been growing.

After two years of sluggishness, India's automobile sector is set to post rapid growth by FY2025-26, supported by improving economic growth and personal incomes. The recovery of the sector in the current fiscal would be driven by commercial vehicles (CVs) and passenger vehicles (PVs).

New model launches, premiumisation, focus on smaller cities and quest for safe personal transport options will stoke demand for PVs and two-wheelers. India's PV segment, currently underpenetrated with 24 vehicles per 1,000 people, is estimated to grow on the back of surge in demand for compact SUV vehicles in India. With non-linear growth trajectory for two-wheelers in India, there is enough headroom for growth in this segment. However, the increase in prices of entry-level two-wheelers and slowdown in rural economy could act as possible headwinds for this segment. The demand for CVs is expected to be stronger, riding on a significantly low base, improving economic activity and government's thrust on road infrastructure. The demand of light commercial vehicles, which hold the largest revenue share for CVs, is expected to be dominated by the fast-moving consumer goods (FMCG) and e-commerce industry. The three-wheeler segment in India is closely linked with crucial economic activities in India. Although the pandemic led to a de-growth in both domestic sales and exports, a steeper dip was visible in domestic volumes for this segment. Currently, many original equipment manufacturers (OEMs) are pushing exports significantly and expanding overseas to mitigate the losses from the domestic market.

Automotive industry is at an inflection point where COVID-19 is accelerating the evolution of consumer preferences. With personal mobility being the preferred mode, there is growing demand for affordable vehicles. Given the financial constraints caused by the pandemic due to job losses, the subscription model has been a big beneficiary phenomenon. A clear sign of this trend picking up is that many automobile manufacturers are offering options for alternate ownership of vehicles to address the need of asset-light models among millennials.

In the post-pandemic months, used vehicle sales have gained momentum driven by lower cost of ownership, Bharat Stage Emission Standards (BS-VI) norms, rising aspirations among buyers and increasing financial penetration. With the emergence of an organised sector in the used vehicle market, the used vehicles segment growth is here to stay.

Another emerging trend that has been transforming the Indian auto sector is the growth of electric vehicles (EV). In recent years, the electric car market in India has shown immense potential for growth. The segment witnessed 168% y-o-y increase in EV sales in FY2020-21. The Indian government has been at the forefront of framing policies (Faster Adoption and Manufacturing of Electric Vehicles (FAME) India Scheme, Production Linked Incentive (PLI) Scheme, Battery Swapping Policy, etc.) related to EV adoption in the country. Many private players have capitalised on the business opportunities that the EV push in India has opened. Indian EV tech start-ups hit an all-time high in 2021. With several automakers rolling out EV vehicles at a rapid pace, the penetration of these vehicles is expected to increase significantly by FY2025-26. Despite the compelling

case for growing EV sector in India, the success of the sector so far has been constrained by ecosystem challenges, such as NBFC liquidity issues, limited financing options, among other factors. Many EVs launched in India have not met customer expectations due to concerns about battery safety and quality, limited availability, and long charging times.

Altered consumer behavior towards digital and technology is redefining the automobile landscape. A plethora of online sales platforms establishing their foothold in the industry bears testimony to this trend. Automobile companies who are leading the way in offering an omni-channel customer experience through new-age digital offerings (virtual tours, negotiations over video calls, and no-contact car buying experiences) are well placed to weather the storm caused by COVID-19.

Besides, connected technology has become the new buzzword in the auto industry, that is set to drive a new age of mobility with technological advancement. Today, majority of buyers prefer a wide range of connectivity features that enhance the overall ownership experience. In the medium to long run, the connected cars would further be redefined as 'Car-As-A-Platform' or CAAP. This growing consumer awareness of technology-intensive mobility solutions is expected to spawn and play a central role in the development of telematics in the Indian automotive market.

The telematics market in India is currently at a nascent stage making up 0.08% of the global market. The ongoing homogenous implementation of Automotive Industry Standards-140 (AIS-140) mandate, provision of emergency buttons and vehicle tracking in all buses, taxis and cabs has led to increased awareness of telematics in the country. The past use cases in India have been heavily centered around the commercial vehicles, owing to the larger productivity benefits CV operators and logistics players can derive from fleet telematics. Though the adoption of telematics in passenger vehicle segment is currently low, it is expected to grow to a dominating share in the future owing to increased uptake of electric vehicles and increasing consumer appetite for more advanced connectivity. Future development of the telematics ecosystem and derivation of subsequent safety benefits, in India can have some impediments owing to the current market challenges that are faced by various stakeholders.

As such, the automotive sector is currently undergoing a profound transformation in many aspects, including fuel efficiency, emissions, consumer preferences and digitalisation. There has been a move towards electric vehicles, safer vehicles, and connected cars. Major regulatory interventions, such as the shift to BS VI, stringent vehicle standards are leading to a shift in vehicle technology. All of these developments are changing the paradigm of how cars are designed around the world. However, as the sector plans its post-pandemic recovery in India, it needs to address multiple challenges, including shortage of semiconductors, disruptions in global supply chain, rising fuel prices, cybersecurity risks, fire hazards in electric two-wheeler batteries, etc.

Living with volatility is now the new normal for the Indian automobile industry due to forces brought on by a dynamic regulatory environment, new business and operational models, interruptions in the supply chain, and changes in consumer tastes. In the sector, expansion, revival, and survival will all coexist. The industry is projected to maintain its positive growth trajectory throughout the decade. However, volatility will continue to accompany expansion.

Indian auto market overview

The automotive industry in India is a significant driver of macroeconomic growth and technological development, representing 7.1% of India's gross domestic product (GDP) and contributing to 37 million employment generation as of FY2021-22. Going forward, the government expects this to increase to 12% and employ 50 million people by FY2025-26. ²

Industry Key Facts

- 

India is home to more than **30** automotive R&D centres
- 

Two-wheelers is the leading vehicle category in terms of production
- 

Sector expected to **attract USD 10 billion** in local and foreign investments by 2023
- 

Indian **EV industry revenue** expected to reach USD 16 billion by 2026

In terms of the production, the automotive industry can be categorised into sub-sectors, such as PVs, CVs, three-wheelers and two-wheelers. The automobile industry of India manufactured 23 million vehicles across categories in FY2021-22.

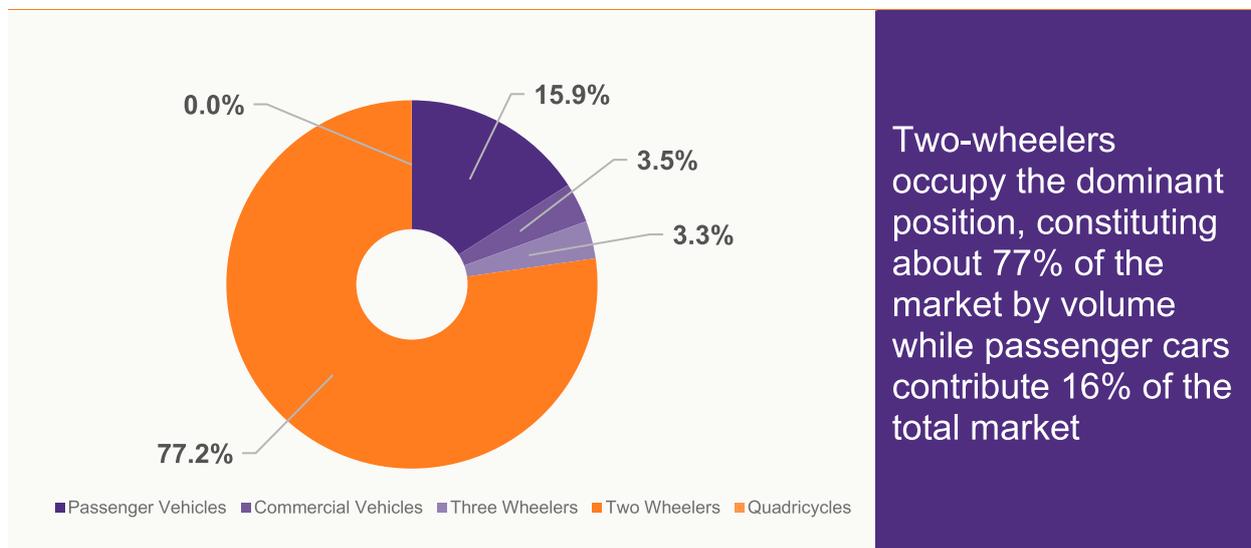


Figure 1: Segment break-up in total production volume, FY2021-22

Source: SIAM

India is currently the fourth-largest automotive market and is expected to be the world's third largest in terms of sales volume by FY2025-26³.

The automobile market in India is poised to grow at a compound annual growth rate (CAGR) of 17.3% from FY2020-21 to FY2025-26 to reach approximately USD 460 billion by FY2025-26.

¹ "Govt aims to raise auto sector contribution to GDP, job creation", Business Standard, August 2021

² "Govt aims to raise auto sector contribution to GDP, job creation", Business Standard, August 2021

³ Invest India, Automobile Snapshot

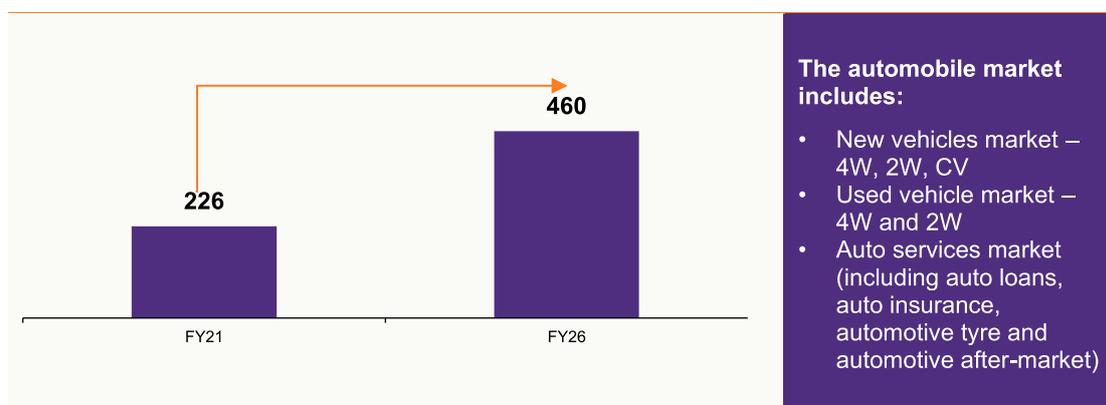


Figure 2: Automobile market in India (USD billion)

Sources: GT Analysis

The automotive market has faced disruptions due to the outbreak of COVID-19, with significant disruptions in the supply chain and manufacturing. The COVID-19 pandemic and its subsequent lockdowns resulted in the Indian automotive industry suffering losses. There were also decrease in imports of auto-components from China due to supply restrictions.

Even prior to COVID-19, the automotive industry was going through a downcycle and is now at the beginning of an upcycle. Auto sales had slowed down due to structural reasons triggered by various regulatory reforms, a decelerating economy, and other factors. This must be seen in the light of the new emission standards that went into effect in April 2020. Due to the need to phase out BS-IV models and gradually ramp up BS-VI models, the manufacturers began the year with a higher cost structure and lower production.

As demand and supply-side problems even out, the Indian automobile sector is poised for growth. The two-wheeler and tractor categories are anticipated to gain from a revival in the rural economy while CVs are expected to benefit from high replacement demand. PV sales, which had remained low because of the semiconductor shortage despite strong demand, too, are picking up pace as automakers started sourcing chips from multiple vendors.

Post COVID-19, the Indian automotive industry is anticipated to experience a potent comeback. The demand for personal mobility is expected to grow with consumers preferring self-owned vehicles to ensure social distancing and reducing dependence on a weak public transport system of the country. The industry is witnessing innovative trends with automakers creating alternate ownership models for potential customers. They are simultaneously creating more entry points for new customers to the market. Particularly in the PV segment, some automakers are providing leasing and subscription options. Better leasing solutions will gain traction in the domestic market as millennials' mobility needs change and shifts away from direct ownership.

Further, rise in digital distribution channels, reducing duration of ownership and increasing premiumisation of vehicles is characterising the consumer preferences towards the sector. Emerging trends, such as connected and safe cars and telematics are shaping the Indian auto industry. The Indian auto market is expected to witness upswing in sales mainly due to increasing focus on use of technology-intensive offerings and burgeoning EV market.

The below sections of this compendium outline the key trends shaping the Indian auto sector in this decade.

Trends shaping the automotive industry

Evolving customer preferences

The dynamics of vehicle purchase behaviour and customer perceptions are changing. The preferences are evolving and more so in a post-COVID-19 India. There are new trends, different expectations and renewed push towards personal mobility, shift to digital purchases, increasing demand for used vehicles and premiumisation and preference for easy financing options. Automakers in India have had to adapt their marketing strategies and product positioning to cater to the evolving market trends and needs of the Indian consumer.

Growing preference for personal mobility

Traditionally, increasing penetration of ride sharing companies has been hampering the sale of passenger vehicles in the automotive market. However, after the outbreak of COVID-19, shared mobility services, such as car sharing, and ride-hailing have been sluggish to return to their pre-COVID-19 pace of growth as consumers prefer using personal vehicles for their transportation requirements. Additionally, compared to metros, Tier 2 and Tier 3 cities have a lower prevalence of ride sharing companies. Consumers in these regions thus, prefer using their own transportation mode.

When the COVID-19 induced lockdowns ended, a similar pattern emerged in China, where car ownership increased relative to car-hailing and sharing. India is anticipated to take a similar course, which could aid in reversing the downward trend in vehicle sales.

As people place a higher value on social isolation and personal hygiene, shared mobility choices are expected to become less popular. **In practise, this would translate into a greater desire for affordable personal mobility, which might increase sales for automakers, particularly in the category of entry-level automobiles in the short to medium term (> 3 years).** However, this trend can plateau in long term (> 3 years), given the adoption of other mobility models.

On the personal mobility front, along with the positive impacting trend of increased preference for personal mobility, a divergent trend has also been witnessed. This second trend adversely impacting demand, is the negative consumer sentiment, reduced economic activity, job losses, and pay cuts.

As a result, in some cases, vehicle purchases have been postponed or the choices for consumers have been altered, some new customers who earlier were not considering buying vehicles, have also become potential buyers due to the necessity that the pandemic has posed.

Subscription model gaining traction

A subscription is a method of owning a vehicle by paying a fixed monthly amount without having to pay down payments or monthly equal monthly instalments (EMIs), car maintenance, or insurance. Millennials in India are quickly adopting leasing and subscription models with their affinity for greater freedom and convenience. **The pandemic has also highlighted the growing move to asset-light options and millennials' preference for experiences over ownership is gaining ground.** COVID-19 could act as a flex point for a faster adoption of the subscription model, which is still in its infancy in India.

Customers are seeking long-term, practical and affordable solutions now that they are accustomed to rental services (chauffeur and self-driven).

Indian consumers can possess a range of vehicles without purchasing them by subscribing to the services offered by various auto brands. Players are stepping up their efforts to attract customers with adaptable subscription options in the wake of COVID-19.

- **Zoomcar** introduced a plan with payment deferral, penalty-free membership cancellation, etc.

- **Maruti Suzuki** launched its subscription services in July 2020 in just two cities and expanded to eight cities in total by 2021. It further plans to expand its geographical coverage to 40-60 cities in the next couple of years.⁴
- **Mahindra & Mahindra** sold more cars through the subscription-based model in October-December 2020, than it did in the entire FY2019-20.⁵
- **Tata Motors** which introduced the subscription model for the Nexon EV last year, also plans to extend the model to its internal combustion engines (ICE) range of vehicles.⁶

In the short to medium term, consumers looking for shared mobility alternatives are anticipated to be drawn to the vehicle subscription model. The model would be better adopted by the consumers with regulatory clarity around registration policies, accident accountability and insurance claims.

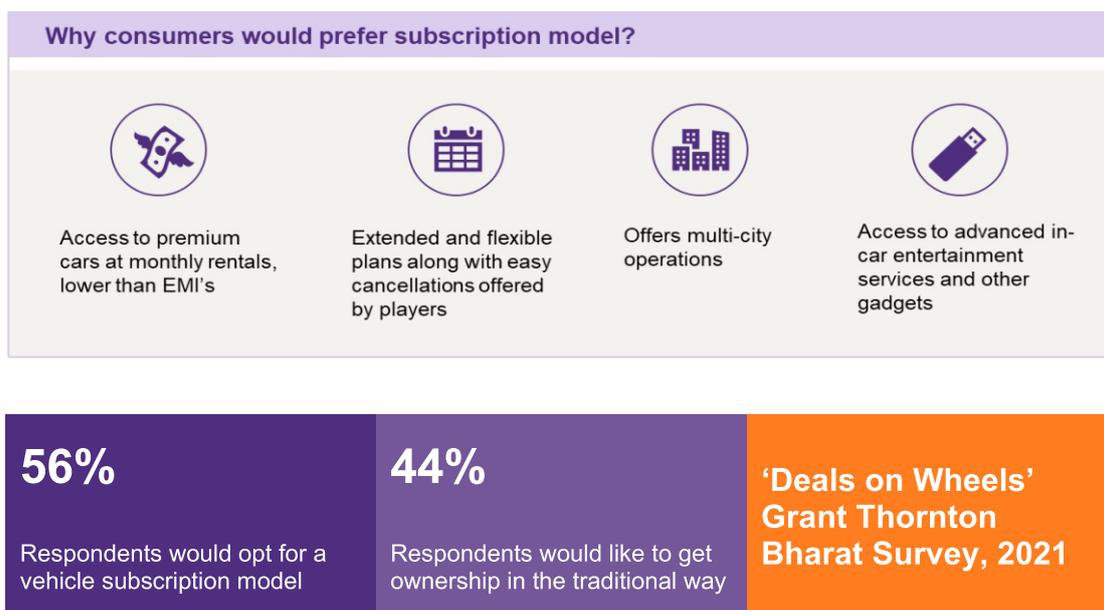


Figure 3: Survey on automobile buying trends

Buying experience shifting from physical to phygital

Traditionally, vehicles were sold primarily through physical dealerships. As per our survey, buying a car online is not yet a preferred method in India and it is expected to take a few more years for consumers to fully adapt to this. However, with the COVID-19 outbreak, a growing preference for contactless digital transactions has emerged as a prominent trend that is projected to spill over into vehicle purchases as well.

Trends in the automotive sector, that were already under way but hadn't yet been extensively embraced, have been expedited by the COVID-19 pandemic. These tendencies will probably become the new standard as individuals spend more time online, highlighting the premise that the majority of possibilities to influence customers through touchpoints are now digital.

Consumer behaviour changes indicate that auto businesses that further digitise their car-buying process are better positioned for success after the pandemic. People's expectations are evolving and they want to be able to interact with brands and make purchases from the comfort of their homes more than ever before.

⁴ "Maruti Suzuki plans to take car subscription business to more cities", Business Standard, February 2022

⁵ "Subscription-based ownership of cars: Many enquiries, but conversion into sales, slow", Business Line, January 2021

⁶ "Subscription-based ownership of cars: Many enquiries, but conversion into sales, slow", Business Line, January 2021

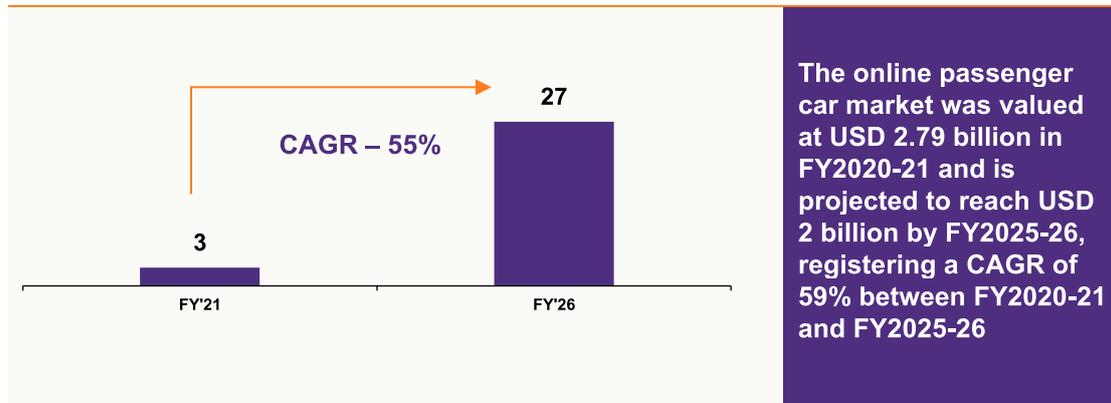


Figure 4: India online passenger car market size (USD billion)

Source: GT Analysis

Customers are now showing interest towards digital channels due to seamless service offerings, including hassle free registration certificate transfer, car checks, security checks and payments. Both, new and used passenger car buyers prefer to do their research and discovery on online platforms since they are easily accessible from the convenience of their home or office. The online-buying trend has been witnessed more in used vehicles segment with the emergence of online used vehicles players. In the online car passenger market in the country, about 72% is accounted by used cars while the remaining 28% is held by new cars.

The auto players are deploying artificial intelligence (AI), augmented reality (AR) and virtual reality (VR) to improve user experience by offering the entire vehicle demo and help customers feel more confident when buying a high-involvement item online. Interactive technologies - chat box, virtual test drives, 360-degree views of the interior, exterior walkarounds and video calls help in solving customer doubts and assists them in decision-making.



Figure 5: Survey on auto buying behaviour in India, Auto Gear Shift India, 2020

Source: Auto Gear Shift India, 2020, Google Report



Digital revolution is disrupting auto retailing, making players gradually shift towards online channel to capitalise on the digital wave to drive sales and growth. Over the past few months, multiple passenger car brands have introduced online sales platforms, which offer customers the chance to purchase their preferred vehicles from the comfort of their homes. OEMs like Maruti Suzuki, Hyundai, Honda, Kia, Toyota, Tata Motors, Mahindra & Mahindra, and Mercedes-Benz have taken to digitalisation amid the pandemic.

By leveraging the latest technology and data solutions with digital interventions, the automobile manufacturers aim to improve the customer experience with the shift from physical to digital. Some of the recent examples include:

- **Honda Cars** launched their virtual showroom which allows customers to interact with the digital version of a car by clicking on various parts.⁷
- **MG Motors** has launched the MG eXpert, a platform for customers to experiences the brand's models using AR and AI, delivering the showroom experience to customers from their homes⁸
- **Audi India** introduced AR and VR at their showroom in Gurgaon, that lets the customer experience the look and feel of the car being configured. They are able to view their customizable car before it is configured.⁹

Further, OEMs are realising that the audience visiting online auto portals maybe more serious buyers and sellers of vehicles and are increasingly shifting digital advertising spend on autos focused platforms from traditional social media.

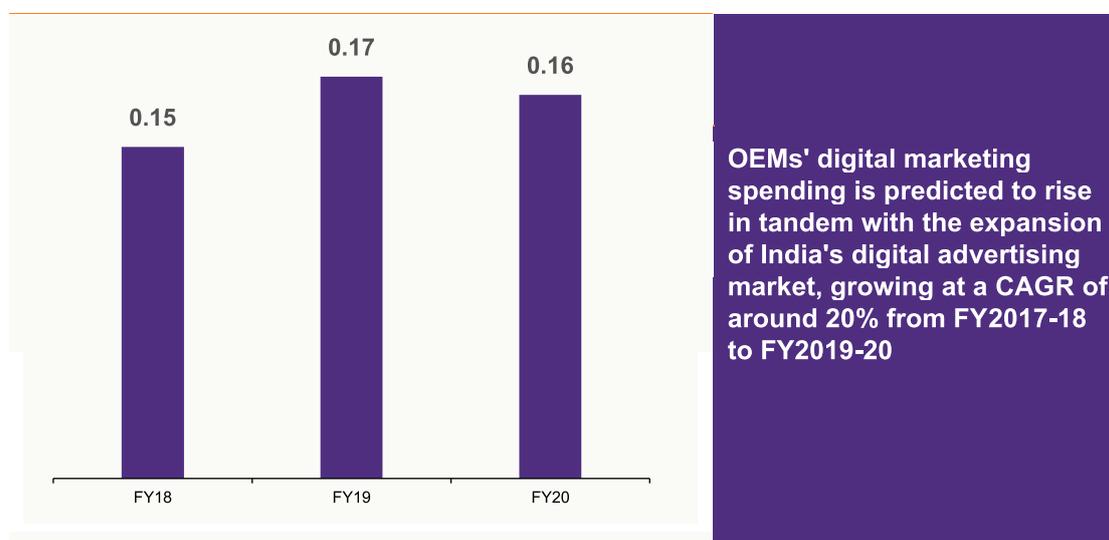


Figure 6: India auto OEMs (passenger cars and 2Ws) ad spend on digital (in USD billion)

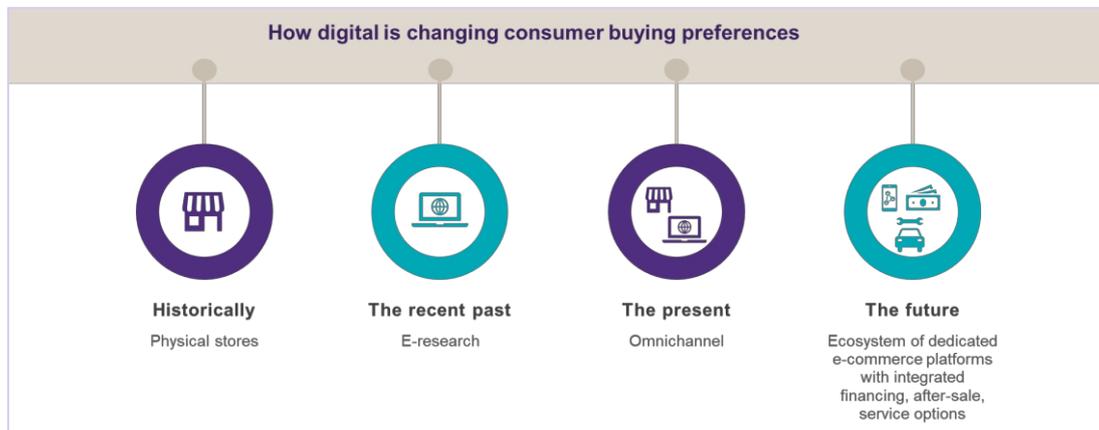
Source: India Used Car Market report, HSBC Global Research, May 2021

⁷ "Use of virtual and augmented reality for new vehicle sales is here to stay: Avataar", Financial Express, September 2020

⁸ "MG launches AR-powered MG eXpert digital platform", AutoCar India, February 2022

⁹ Audi website, August 2019

Digital channels of sales have changed how dealer, manufacturers and even aftermarket ancillaries market their products online. Some automobile companies have made considerable progress in adopting omni-channel customer engagement solutions.



Increasing affinity towards used vehicles

As more people are shifting towards personal mobility as compared to public transport after the onset of pandemic, the demand for used vehicles among consumers has increased due to their lower cost of ownership. Even before COVID-19, the BS-VI norms had set the stage for the growth of pre-owned vehicles. Further, rising aspiration among car buyers is primarily driving consumers to higher segments of the used car market.

All these factors together coupled with the paradigm shift towards online platforms have provided the right mix for accelerated growth of the used vehicle segment. Many affluent buyers have started selling or exchanging luxury cars as it has become more convenient and accessible to use these online services. High rate of depreciation value of the luxury cars, fast growing base of young population, increasing disposable income of the consumers and rapid urbanisation are some of the major factors driving the growth of the used luxury cars.

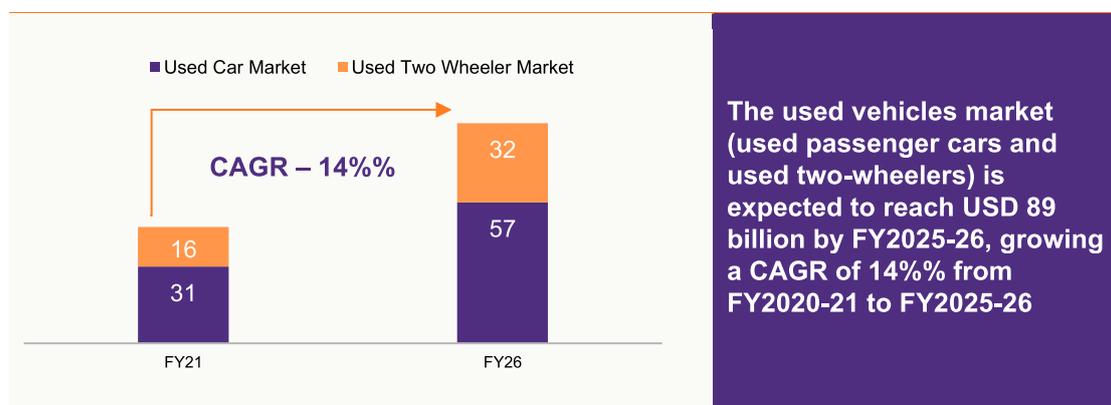


Figure 7: Used vehicles market in India (in USD billion)

Source: GT Analysis

Reduced first ownership period of vehicles by customers is also responsible for the rise of the used vehicle industry. Another key growth driver of the used vehicle market is the increasing financial penetration. The used passenger car finance penetration stood at 17% in CY2019 and is estimated to increase to 35% in CY2025.¹⁰

With the emergence of an organised sector in the used passenger car market, the demand for used passenger cars has witnessed a rise, owing to the improved quality standards for buying and selling used passenger cars. There is increasing demand for pre-owned cars in Tier 2 and Tier 3 cities, largely on the back of growth of organised players offering reliable products and services.

The increasing penetration of online platforms in the used passenger car market has allowed dealers to reach a wider audience. Pure classifieds and discovery-based platforms dominated the online used automobile market for the longest time. The market is now, however, moving towards transaction-based models, which provide significant added value for both dealers and end-users, as well as a stronger monetisation path for the platform. The trend is evident in the way even the classifieds and discovery-based platforms have launched transaction-based product offerings.

With the entry of start-ups, such as Droom, Car Dekho, Spinny, etc. in India, the pre-owned vehicle market received a fillip. The companies have brought a clear disruption in India's used vehicle market; however, they face a policy vacuum. The new-age start-ups having online presence as well as offline outlets across India are able to increase their customer base, not only in metro cities but also in Tier 2, Tier 3 and Tier 4 cities.

Growing awareness for connected and safer cars

A connected car can communicate with other vehicles or systems through a single device. Consumers can access internet and share data with other devices, both inside and outside the connected vehicle.

In India, connected car technology is still in its infancy, with only 5% of vehicles equipped with infotainment systems and digital cockpits. Connectivity is primarily limited to smart phones and in-car infotainment systems. However, customer preference for connected software solutions in passenger vehicles is expected to grow significantly in the coming years and vehicle manufacturers are aligning their strategies to capitalise on this evolution in the automotive ecosystem. While overall car sales fell in 2020, the penetration of connected cars has increased from 12.9% to 20.9%.¹¹ By 2025, most cars in India are expected to be connected to users' homes and offices.

- In India, Hyundai was the first manufacturer to launch its BlueLink connected vehicle technology with its Venue compact sport utility vehicle.¹²
- New entrants such as MG Motor and Kia Motors were the ones to follow with their respective products.
- Kia India has sold 1.5 lakh cars with connected software in the country between 2019 and 2021, in two years of the launch of its first product in the domestic market.¹³

In the medium to long run, the connected cars would further be redefined as 'Car-As-A-Platform' or CAAP. CAAP introduces software as an enabler with a slew of service partners in the vehicle. SIM connectivity and Internet of Things (IoT) solutions allow car owners to gain real-time access to connectivity, infotainment, and telematics. It creates digital ecosystems in which suppliers can connect directly with end users, potentially opening up a plethora of new revenue streams in the future.

¹⁰ "India Pre-Owned Car Market Study", Frost & Sullivan, 2021

¹¹ "SIM-embedded connected cars slowly gaining popularity in India", Economic Times, February 2021

¹² "Preference for connected cars to grow sharply in next few years: Deloitte", Live Mint, July 2020

¹³ "Kia sells 1.5 lakh vehicles with connected software in India in two years", Live Mint, August 2021

In terms of technologies, AI, blockchain, 5G, IoT and vehicle data will be key drivers, enabling more customised services that customers value, as well as cybersecurity, which will determine customer acceptance.

Future outlook of CAAP

<p>In-car payments and e-wallets</p> <p>The e-wallet, a digital payment assistant within the vehicle that can automatically make transactions without driver intervention, is an important use case in the connected vehicle context. These could be parking fees, battery charges or tolls, for example.</p>	<p>Entertainment</p> <p>Next-generation digital services, such as high-quality music and video streaming, in-car gamification and in-car karaoke will significantly expand the opportunities for in-car experiences.</p>	<p>Convenient refuelling at fuel stations</p> <p>Fuel stations (petrol pumps or charging stations) can collaborate with OEMs to provide a more convenient and faster auto payment experience at the pump.</p>
<p>Integrated long route travel planning</p> <p>Service providers can collaborate with navigation and map partners to provide access to verified hotels enroute, nearby medical aids, restaurants/food options of choice and so on, with advanced booking options available in the car itself.</p>	<p>V-Commerce</p> <p>Customers are already making use of voice-activated car assistants. Customers can use these assistants to make purchases through the dashboard or through phone apps. Integration of such apps may pave the way for voice commerce.</p>	<p>Automated car repair notifications and suggestions</p> <p>Smart notifications alert drivers when a service is due or a repair is imminent. Taking it a step further, smart cars can analyse a specific problem and allow drivers to compare repair costs before deciding on a service location. They can also suggest nearby service stations and compare service charges and costs using geofencing. Add in automated payments, and the driver's experience becomes even more streamlined.</p>

In terms of consumer preferences, technology and innovation are at the forefront of the connected car space in India's automobile industry. The future trend is toward digital transformation, with vehicles becoming an ecosystem of on-demand, in-car services rather than just mobility solutions.



(Mobility Outlook Survey, 2021)

This in turn has encouraged automakers to improve their safety features. Several popular vehicle models in the country have received four stars or more in the Global New Car Assessment Programme (NCAP) crash test in recent years. Nissan Magnite and Renault Kiger received four stars in the Global NCAP crash test in 2022. In addition, the Honda City and Honda Jazz received four-star crash test ratings.

Immersive online purchase environment for two-wheelers

Smartphones have emerged as the new storefront and purchase guide for two-wheelers. As per the report Auto Guide Shift India, 2020, 54% of the two-wheeler buyers find their dealers online through dealer websites, search engines and brand websites. Even when majority of the prospective buyers visit dealers, the hybrid experience is more to assess the vehicle rather than making an actual purchase. Thus, two-wheeler dealerships are slowly squeezing into an exhibit of physical attributes of the vehicles rather than the point of purchase. The same report indicated that 67% of the potential buyers swipe their smartphones, while at the dealer to assess and evaluate best deals and compare interest rates and insurance packages to minimise the total purchase amount. Approximately 45% of prospective two-wheeler buyers start their journey online.

Agility and innovation driving the CV segment

The CV segment, which serves as a barometer for economic growth as well, is gradually moving towards a more agile and organised model. With technologies such as online market for purchasing commercial vehicles, to predictive maintenance, and shorter model cycle and operational expense models- CVs are easier and faster to acquire. Coupled with the drive for e-mobility, with electric CV option coming to the forefront, models such as Mobility-as-a-Service and EV retrofitment are paving way for new business models to come to a forefront.

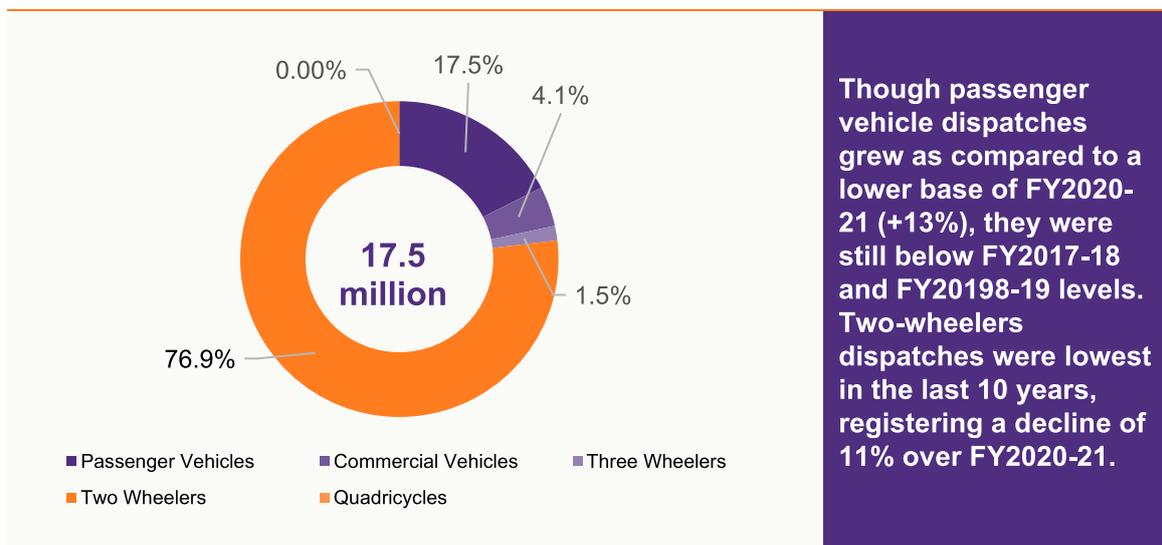
Digital technologies and connectivity will shape processes, such as fleet management, optimising and monitoring activities and transportation efficiencies. There is an increased focus on vehicle safety and guidelines for companies operating commercial vehicles also, as the segment matures. Standards such as AIS 140, will view increased enhancement as well as adoption especially by industries such as bus operators, CVs used by educational institutions, taxi ride-hailing services, and more.

Report analysis, Auto Guide Shift India, 2020
14



Trends by vehicle type

In the pre-pandemic era, despite the challenges, such as the change in axle norms, BS-VI transitions, credit availability and new CAFÉ norms, the automotive sector had shown a great scope of growth. However, COVID-19 amplified the challenges (both on the demand and supply side) with significant decline in sales. Reduced economic activity induced by the lockdown, including significant decline in employment, especially in the rural areas caused a damper on the overall demand of automobiles in India, with two-wheelers market facing the hardest blow. The supply chain challenges caused due to shortage of semiconductor chips and other raw materials, led to reduced production capacities in the industry, bringing the global automobile supply chain under scrutiny, especially for four-wheelers.



Though passenger vehicle dispatches grew as compared to a lower base of FY2020-21 (+13%), they were still below FY2017-18 and FY2019-20 levels. Two-wheelers dispatches were lowest in the last 10 years, registering a decline of 11% over FY2020-21.

Figure 8: Segment break-up in domestic sales FY2021-22
Source: SIAM

On a positive note, there was a 36% Y-o-Y growth in exports in FY2021-22, despite the industry's underperformance.

Passenger vehicles

The PV industry has seen a V-Shaped recovery, with car sales picking up gradually. Semi-conductor supply is picking up, with the global supply chain resurging from COVID-19 and factories operating at full capacity.



Figure 9: PV domestic sales
Source: SIAM

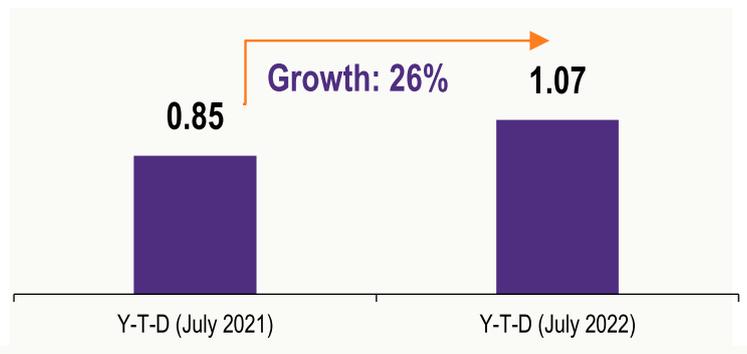


Figure 10: PV Domestic Sales, YTD FY2022-23

India's PV Segment is underpenetrated (as of FY2021-22) with 24 vehicles per 1,000 people.¹⁵ A growing per capita income will lead to an increase in demand for PVs. The car market is estimated to grow at a CAGR of 16% between 2021 and 2026.

The reasons for the same are:

- **Increased need for personal mobility**, induced by- new entrants in the workforce (with more women and younger generation entering the job market), improved per capita income (causing an increased propensity to spend), and less preference towards public transportation since the onset of pandemic.
- **Gradual growth in demand in Tier 2 cities** and rural segment.
- **Increase in exports, due to improved safety standards adopted by Indian manufacturers, as well as economic growth experienced by India's export market**

Y-o-Y analysis	Production (Y-o-Y heat map)	Domestic sales (Y-o-Y heat map)	Exports (Y-o-Y heat Map)
2017-18	6%	8%	-1%
2018-19	0%	3%	-10%
2019-20	-15%	-18%	-2%
2020-21	-11%	-2%	-39%
2021-22	19%	13%	43%

Figure 11: Year-on-Year (Y-o-Y) analysis of production, domestic sales and exports of PVs

Source: GT analysis

Trends shaping the Indian PV segment

Emission and safety norms

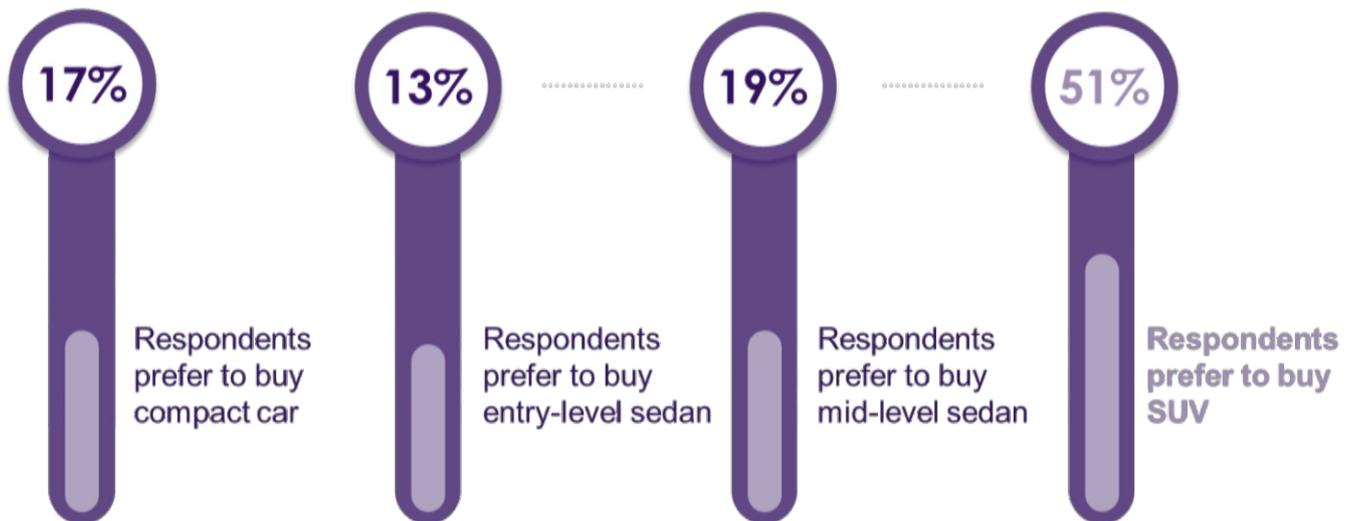
Indian vehicles are set to compete globally with their updated emission and safety norms, which will further promote vehicle exports.

The adoption of **BS-VI** and **CAFÉ-II norms (Corporate Average Fuel Efficiency Norms)** has been vital towards improving emission levels. Similarly, safety norms, such as rear parking sensors, driver and passenger airbags, manual override switch for central locking systems, anti-lock braking system (ABS), seat belt reminder (mandatory for co-driver as well) and speed limit reminder have been introduced for all vehicle types. Additionally, **Bharat New Car Assessment Programme (BNCAP)** proposed by the Ministry of Transport and Highways (MoRTH), slated to come into effect from April 2023, will be key towards streamlining pollution and safety standards for PVs sold across country.

Though their implementation will drive up manufacturing costs (by an estimate of 10-15%), these standards are vital for ensuring pollution control and road safety.

Premiumisation of PVs

In the last few years, there has been a considerable shift in buyers' preference towards premium car categories like sports utility vehicles (SUVs) due to comparatively more space, better comfort, driving experience and maneuverability, compared to sedans or hatchbacks. In recent years, there has been a surge in demand for compact SUV vehicles in India.



UVs' market share in the passenger vehicle market has steadily increased over the last decade, owing to new launches at attractive price points, a GST differential that leads to increased sales of compact UVs, and changing consumer preferences. As a result, of recognising the huge potential in this segment, most passenger car OEMs are transitioning towards introducing new products or strengthening their SUV portfolio.

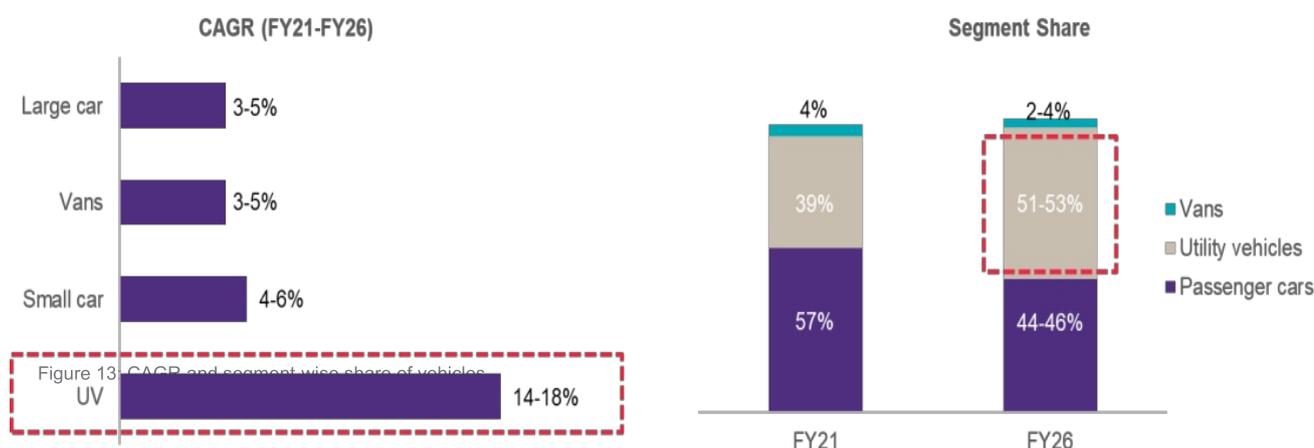
In January 2020, [Fiat Chrysler Automobiles NV \(FCA\)](#) announced that it will invest USD 250 million to grow its presence in India, with the launch of four new SUVs under its Jeep brand over the next two years.¹⁶ Besides, FY2021-22 witnessed several UV launches, such as [Tata Punch](#), [Mahindra XUV700](#), [Skoda Kushaq](#), and [Volkswagen Taigun](#). Given that all of the major upcoming launches are in this segment, the uptick in the UV segment is expected to continue in the near term.

In recent years, there has been a surge in demand for compact SUV vehicles in India from 15% in FY02 to 48% in the first nine months of FY2021-22, signalling a clear shift in consumer preference. Moreover, SUVs are priced over INR 10 lakh and the increasing interest among consumers is indicative of their willingness to spend more on vehicles, which can also be used for off-roading and come equipped with safety features.

Between FY2020-21 and FY2025-26, UVs are expected to outperform other segments by registering a CAGR of 14-18% compared with just 4-6% in small cars.



¹⁶ "Fiat Chrysler to invest \$250 mn in India unit to launch new SUVs", The Hindu, January 2021



Source: "UV Thrust Report", CRISIL, March 2022

*Small car segment includes micro, mini and compact vehicles whose lengths vary from 3,200 mm to 4,000 mm. The remainder (excluding vans and UVs) are classified as large cars.

Two-wheelers

India being the largest two-wheeler market globally, has shown a CAGR of 8% from FY2013-14 to FY2017-18 period. The industry recorded its (till date) all time high in FY2018-19, by recording north of 21 million units in sales, which was almost double the sales in FY 2010-11 at 11.8 million.

With only 2% of Indian population buying two-wheelers every year as of FY2021-22, there is a huge scope of growth. However, the trajectory has not been linear.

Challenges faced by the two-wheeler industry:

Increase in prices of entry-level two-wheelers: Reasons for increase in cost of two-wheelers

- a The graduation from BS-IV to BS-VI called in for complex modification of engines to ensure compliance with the emission rules, which led to an increased cost of production for two-wheelers.
- b The stricter vehicle safety and regulatory norms have resulted in for greater safety assurance costs. In 2019, it became mandatory for all two-wheelers with engine displacement over 125cc to be equipped with ABS systems, while for vehicles with Engine displacement below 125 cc to be equipped with combi-braking system (CBS)
- c The overall cost of insurance of two-wheelers has gone up. Since 2018, it became mandatory for a new bike owner to pay the third-party premium upfront for five years.

Slowdown in the rural economy

The rural economy (especially the trading community, which is the target group for two-wheelers), has been hit poorly due to the pandemic. It is still under pressure, due to inflation leading to reduced disposable income which has resulted in a less propensity to spend, impacting the sales of two-wheelers.

Postponement in purchase

With the EVs coming in the market, the immediate impact on the sale of two-wheelers owing to switch to EVs is marginal. However, there has been a change in terms of mindset. The prospective customers are postponing purchase because they are debating purchase of EVs over internal combustion engine (ICE) vehicles.

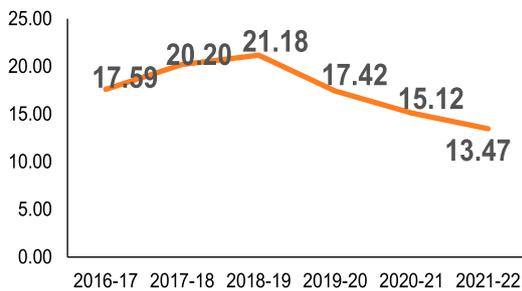


Figure 14: Two-Wheeler Domestic Sales
Source: SIAM

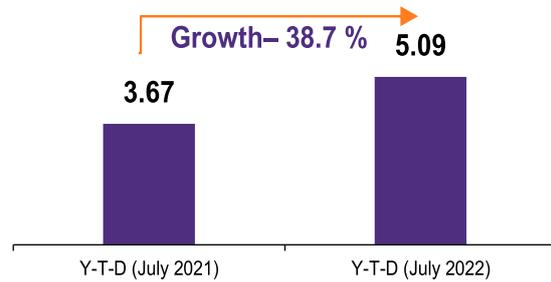


Figure 15: Two-wheeler domestic sales, YTD FY2022-23

Y-o-Y analysis	Production (Y-o-Y heat Map)	Domestic sales (Y-o-Y heat map)	Exports (Y-o-Y heat map)
2017-18	16%	15%	20%
2018-19	6%	5%	17%
2019-20	-14%	-18%	7%
2020-21	-13%	-13%	-7%
2021-22	-3%	-11%	35%

Figure 16: Y-o-Y analysis of production, domestic sales and exports of PVs
Source: GT Analysis

Trends shaping the two-wheeler segment

Evolution of electric two-wheeler market

Coupled with the government initiatives and the drive from stakeholders to foster EV ecosystem in India, the sales for two-wheeler EVs in India are slowly gaining traction and are projected to grow at an accelerating pace.

The Indian e-two-wheeler market is expected to hit between 4.5-5 million by 2025, accounting for 25-30% of the total market, and further at approximately 9 million by 2030.¹⁷

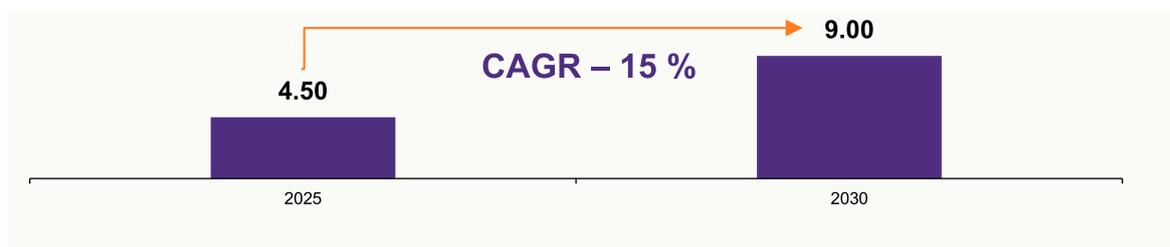


Figure 17: Projected growth of e-two-wheeler market in India

Growth in exports

With over 35% Y-o-Y in FY2021-22 rise in exports levels for two-wheelers, there is a significant demand overseas. Some prominent export/overseas manufacturing markets include South Asia, Africa, Middle East and Latin America. As these areas experience economic growth and development, the demand for two-wheelers is on a continuous increase.

Out of all two-wheeler categories (scooters, motorcycles, and mopeds), motorcycles make up for almost 90% of total exports

Premiumisation of the market

Though the entry-level two-wheeler segment is still facing headwinds, the sales for **premium models (engine capacity over 500 cc)** are gradually foraying towards pre-covid levels, due to **increased interest in this segment.**

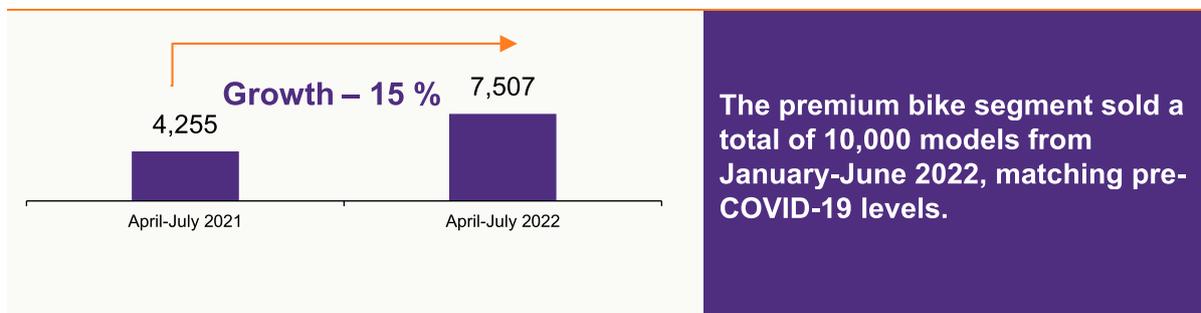


Figure 18: FY2022-23 Q1 sales growth for premium two-wheelers

The palpable interest in the premium segment is largely owing to a shift from functional purpose to an expression of freedom, exploration, and adventure. With the bike riding ecosystem spawning up because of younger demographic showing interest in biking clubs and travel expeditions, the premium segment is expected to grow.

Major OEMs are venturing into the premium segment, either through joint ventures or by launching newer models to gauge short to near term demands.

Commercial vehicles

Commercial vehicles sales, while being an active contributor to the automotive industry, are also a barometer of the economic activity within the country. With the pandemic hampering the economy and curtailing movement, the sales for commercial vehicles have been muted since their last peak in 2018-19. However, the industry is gradually making a comeback, with commercial activities picking up.



Figure 19: CV domestic sales
Source: SIAM

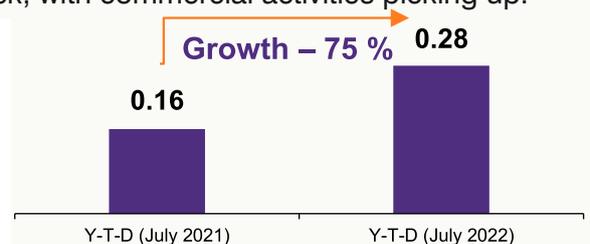
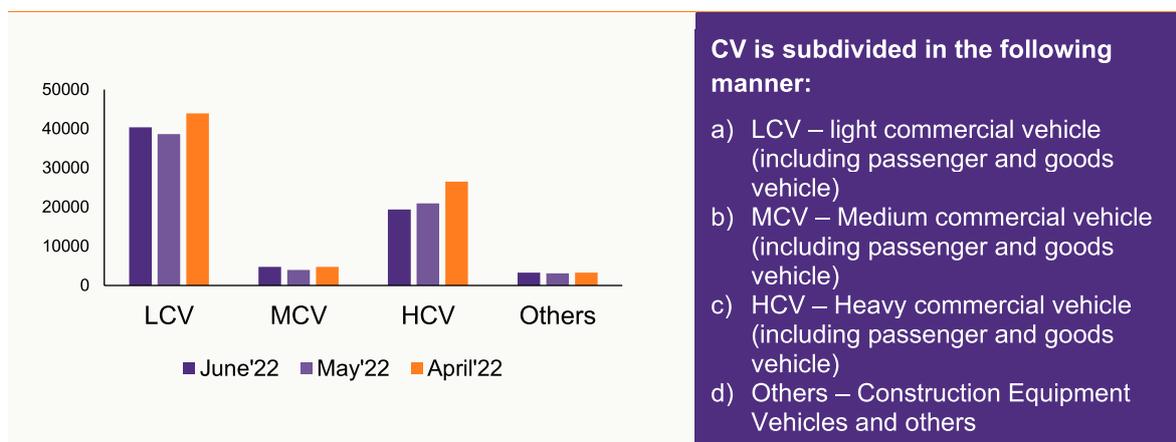


Figure 20: CV domestic sales, Y-T-D FY2022-23



CV is subdivided in the following manner:

- a) LCV – light commercial vehicle (including passenger and goods vehicle)
- b) MCV – Medium commercial vehicle (including passenger and goods vehicle)
- c) HCV – Heavy commercial vehicle (including passenger and goods vehicle)
- d) Others – Construction Equipment Vehicles and others

Figure 21: CV data-segment analysis for Q1FY2022-23

Source: FADA

- The LCV experience an advantage of navigating through narrow roads and steep terrains, vital to ensure last-mile connectivity.
- Industry is estimating the demand for light and medium heavy trucks (over 3.5 tonne) to increase to nearly 0.43 million units in FY2022-23. This demand will be higher than 0.34 million units in FY2021-22, but still significantly lower than the last peak of 0.56 million units in FY2018-1918.
- Sales of heavy-duty trucks, which remained at 0.16 million units in FY2021-22 against a previous peak of 0.30 million units, is gradually catching up. The sales of buses were most hit by the pandemic, with only 17,500 units in FY2021-22, as compared to the previous peak of 64,000 units. However, the segment is projected to cross the earlier peak in the upcoming 2-3 years with an increased need of mobility and urbanisation shaping up the sales.

Y-o-Y analysis	Production (Y-o-Y heat map)	Domestic sales (Y-o-Y heat map)	Exports (Y-o-Y heat map)
2017-18	11%	20%	-11%
2018-19	24%	18%	3%
2019-20	-32%	-29%	-40%
2020-21	-17%	-21%	-17%
2021-22	29%	26%	83%

Figure 22: Y-o-Y analysis of production, domestic sales and exports of CVs

Source: GT Analysis

After peaking in FY2018-19, CV sales fell sharply by 29% in FY2019-20, and 21% in FY2020-21, as there was a huge dent in demand owing to high fuel prices, mobility restrictions due to COVID-19, easing of axle norms and economic contraction.

Around 92,000 units of CVs were exported in FY2021-22 vis-a-vis around 50,000 units in FY2020-21, leading to an 83% increase in exports. This jump in exports can be attributed to sharp increase in manufacturing as well as shipments with international geographies opening up.

The Indian CV market stood at USD 1,900 million in FY2020-21. The market is further projected to grow further to USD 4,257 million by FY2026-27, registering a CAGR of 15%.

Trends shaping the Indian CV segment

Infrastructure development

The INR 100 trillion project, Gati Shakti, announced by the government in August 2021, is aimed at boosting economic growth through Infrastructure. With the goal to provide holistic and integrated growth within the country, the project is also focused on creating opportunities for new future economic zones and aims to reduce transportation time and connectivity via roads. This will cause a major boost in the economic activity, and coupled with improved road connectivity, CVs are expected to experience a direct as well as indirect boost in sales.

This massive infrastructure push is expected to improve CV sales by 18-23% this fiscal year¹⁹, with the industry expected to sustain its growth momentum in the near future. Additionally, MHCVs are expected to grow at 37-42% this fiscal, owing to demands from the infrastructure segment, such as construction, steel, cement, and mining.

Growth in e-commerce and last-mile delivery

The demand of LCVs, which hold the largest revenue share for CVs, are expected to be dominated by the FMCG and e-commerce industry. With a rise in per capita income, growing internet penetration discount offers provided by online shopping platforms, with easy payment and financing options- the FMCG sector, is experiencing accelerated growth and is also aiding the growth of Indian SCV market.

The small commercial vehicles experience advantages such as wider reach to narrow roads, and ease in navigating across hilly terrains, vital for last-mile connectivity. **The LCV volume is expected to rise 9-14% in FY2022-23 on account of higher demand for last-mile connectivity fuelled by sectors, such as FMCG, pharma, construction, and e-commerce.**

Connectivity consolidation and automation

The CV market, which was largely fragmented and not too organised via technology, is changing with Interact Analytics consolidating the industry. The focus is shifting on developing global platforms, which provide access to high quality automated solutions, fostering connectivity across supply chain, while facilitating easy payment options. While the future of connected vehicles is not very clear in the CV segment, application of telematics to ensure an end-to-end integration of various technological cogs.

Evolving vehicle architecture

The traditional classic architecture for CV, heavily customised by OEMs to fit multiple vocations didn't evolve much in the past decade. However, a breakthrough towards electric mobility provides an opportunity for powertrain innovation at a larger level. Beyond the requirement to replace the engine with an electric motor, there is significant innovation that is underway with respect to overall design and software control layer.

Three-wheelers

The three-wheeler segment in India is closely linked with crucial economic activities in India. The segment has been privy to headwinds since its previous peak in FY2018-19, with a steep decline in FY2020-21, when it clocked around 2,16,000 units in the fiscal year. This decline was mostly faced by the passenger carrier segment as last mile shared mobility and commercial activities were close to negligible in the peak lockdown months during the pandemic. Additionally, the goods carrier segment is also facing turbulences due to shift towards LCVs and emerging adoption of e-three-wheelers in the e-commerce space. The segment also faced a blow owing to the price hike after the transition to BS-VI segment.



Figure 23: Three-wheeler domestic sales
Source: SIAM

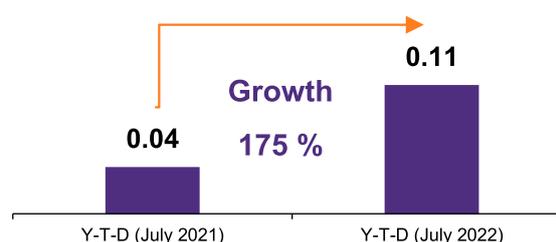


Figure 24: Three-wheeler domestic sales, YTD FY2022-23

- Indian three-wheeler market is segmented based on vehicle and fuel type.
- Based on vehicle type, it can be divided into passenger carrier and load carrier. Passenger carrier holds the dominant share of the market (approximately 83% in FY2019-20)20 and is likely to continue through 2026. The growth is due to three-wheelers used for mobility purposes, as well as three wheelers prominently used for last-mile connectivity.

Y-o-Y Analysis	Production (Y-o-Y heat map)	Domestic sales (Y-o-Y heat map)	Exports (Y-o-Y heat map)
2017-18	30%	24%	40%
2018-19	24%	10%	49%
2019-20	-11%	-9%	-12%
2020-21	-46%	-66%	-7%
2021-22	23%	19%	35%

Figure 25: Y-o-Y analysis of production, domestic sales and exports of three-wheelers

Source: GT Analysis

Although the pandemic led to a de-growth in both domestic sales and exports, a steeper dip was visible in domestic volumes, due to slowdown (pandemic induced lockdowns and lower economic activity) and increasing adoption to e-three wheelers. Currently, many OEMs are pushing exports significantly and expanding overseas to mitigate the losses from the domestic market.

The three-wheeler space is gradually experiencing a demand recovery, even though it's not back to pre-COVID-19 levels. Furthermore, it is evident that e-rickshaws are the biggest mover in the three-wheeler segment. **In July 2022, e-rickshaws made up for 52% of total sales for three-wheelers, as compared to 35% in July 2021.**²¹ The PV category in three-wheelers is also experiencing a demand growth.

Trends shaping the Indian three-wheeler segment

Increase in the share of electric three-wheelers

Electric three-wheelers are gradually emerging as a preferred option amongst consumers. This growth is aided by rising fuel costs, as well as input costs in the ICE segment. Additionally, with various government initiatives, such as FAME-II and PLI schemes to support domestic manufacturing of EVs in the country, this segment is expected to grow at an accelerated pace.

Various industries such as pharma, e-commerce, textile, FMCG, retail prefer three-wheelers as a last mile connectivity solution since it offers exceptional manoeuvrability at affordable prices. With the vast need for delivery solutions, the logistics ecosystem is evolving by effectively integrating technology, infrastructure, and prompt services at reasonable costs- enhancing the preference for three-wheelers as a last mile delivery solution.

Increased use of ride-hailing services

Cab aggregators expect India to become a fast growing and profitable market soon, backed by heavy demand and low penetration of ride-hailing. **Ride hailing penetration in India is 0.3%, which is one-tenth the penetration numbers in markets such as the US²², signalling immense scope for growth in India.** Ride hailing companies, such as Ola and Uber view India as a long-term investment and are looking to push two-and three-wheeler products. **Uber Moto and Uber Auto, which offer rides on motorbikes and autos, are amongst the fastest growing segments for Uber in India.** According to a report by Public First commissioned by Uber, earnings for drivers and indirect effects like car maintenance created economic value worth INR 44,600 crore in India in 2021. The report also estimated that Uber Created a consumer surplus of INR 1.5 trillion in India last year.

Emergence of EV segment

Electric Vehicle or EV Industry, though at nascent stages, is gradually gaining momentum in India. With the rise in population and accelerated growth in demand for vehicles, dependence on conventional energy sources is not a sustainable option, especially with **India importing close to 80% of its crude oil requirements.** The ongoing EV adoption in India is based on the Paris Agreement to reduce carbon emissions, improve air quality, and reduce oil imports.

The government aims to electrify 70% of all CVs, 30% of private cars, 40% of buses and 80% of two-wheeler and three-wheeler sales by 2030.²³ This is line with the goal to achieve net zero carbon emissions by 2070.

²¹ FADA Report, GT Analysis

²² Mint

²³ IBEF

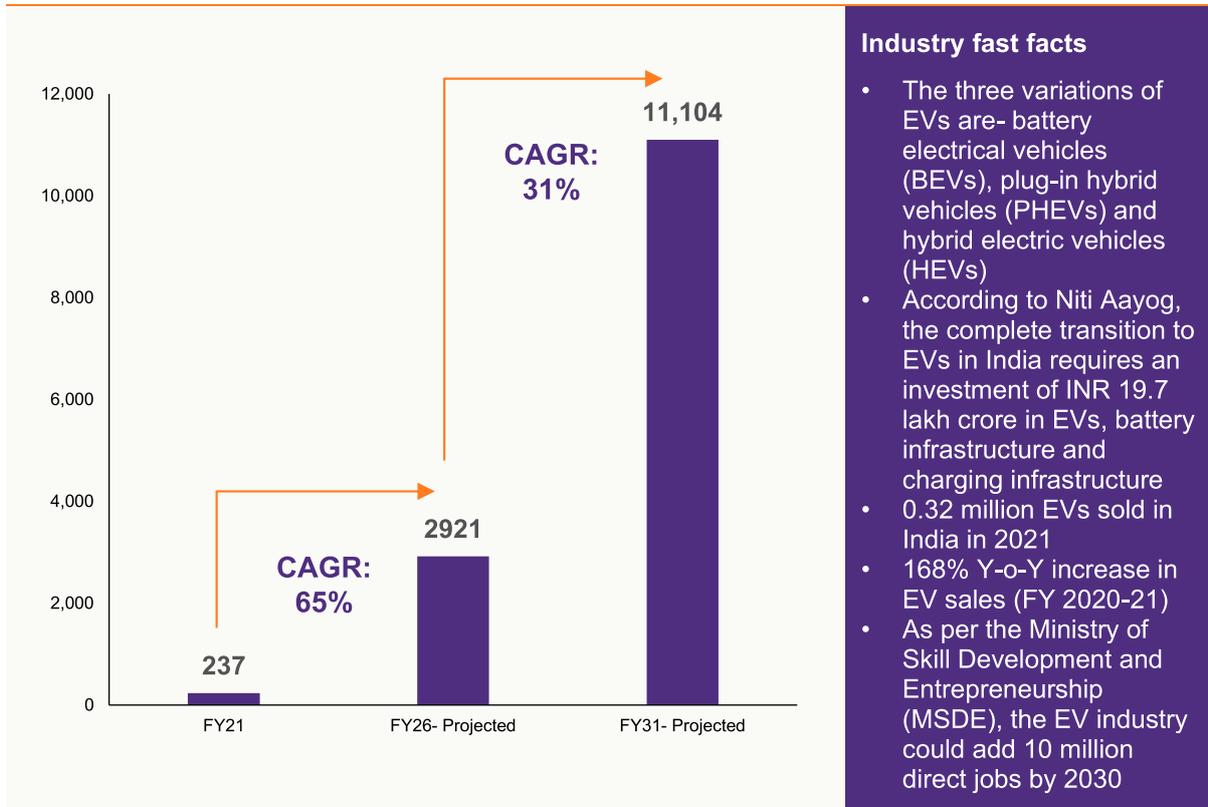


Figure 26: India's EV market volume ('000)

Source: Industry estimates, Yes BANK Analysis

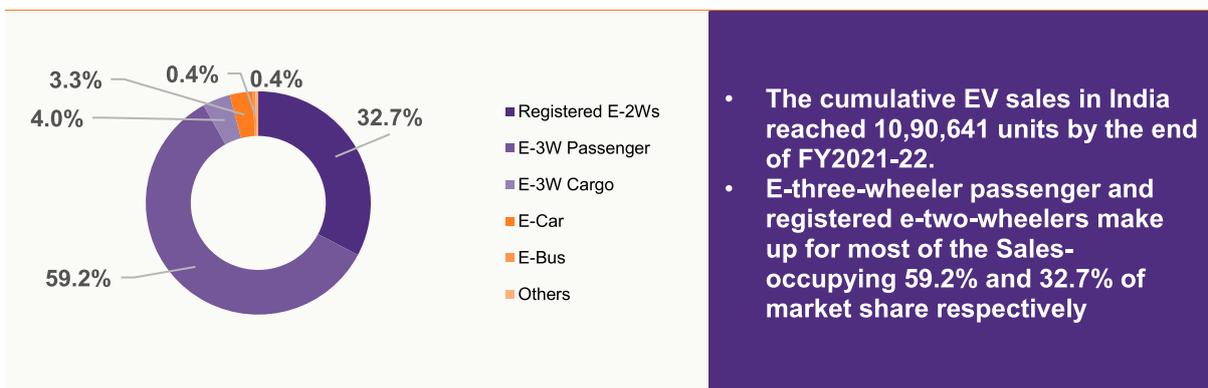


Figure 27: Vehicle category-wise market share (cumulative till FY2021-22)

Source: JMK Research



Market segmentation and penetration analysis

- **Electric two-wheelers (E2Ws):** On an annual basis, the sales for electric two-wheeler segment recorded an increase of 75% in FY2021-22 over FY2020-21. Electrification of two-wheelers is increasing with penetration expected to grow from ~1% to ~10% between FY2020-21 to FY2025-26.
- **Electric three-wheelers (E3Ws):** On an annual basis, the combined sales for Passenger and Cargo Electronic 3-Wheeler Segment recorded an increase of 102% in FY2021-22 over FY2020-21. Electric rickshaws are gradually replacing cycle rickshaws in Tier-I and II cities. On the other hand, share of cargo e-3W increased from 3.7% to 11% between FY2020-21, with the category growing by 97%. Level of penetration of e3W sales is expected to grow from ~41% in FY2020-21 to ~42% in FY2025-26, marking it as one of the saturated segments currently. For eLCVs, the level of penetration is expected to grow from 0.01% in FY2020-21 to 4% in FY2025-26.
- **Electric cars (e-cars):** On an annual basis, e-cars registered an increase in 275% in FY2021-22 over FY21. The level of penetration of e-cars is expected to grow from ~0.17% in FY2020-21 to ~4% in FY2025-26.
- **Electric buses (e-buses):** On an annual basis, E-buses sales increased by 220% in FY2021-22 over FY2020-21. These sales, however, only make up for 11% of total order book of 10,000 e-buses received between FY2020-21 and FY2021-22. The level of penetration for e-buses is expected to grow from ~2% in FY2020-21 to ~6% in FY2025-26.
- **Charge points:** As per the Bureau of Energy Efficiency, total of 1,742 public charging points were recorded (cumulative till date in FY22). As of March 15, 2021, DSI has sanctioned 3,397 charging stations under FAME Scheme.

State-wise sales analysis

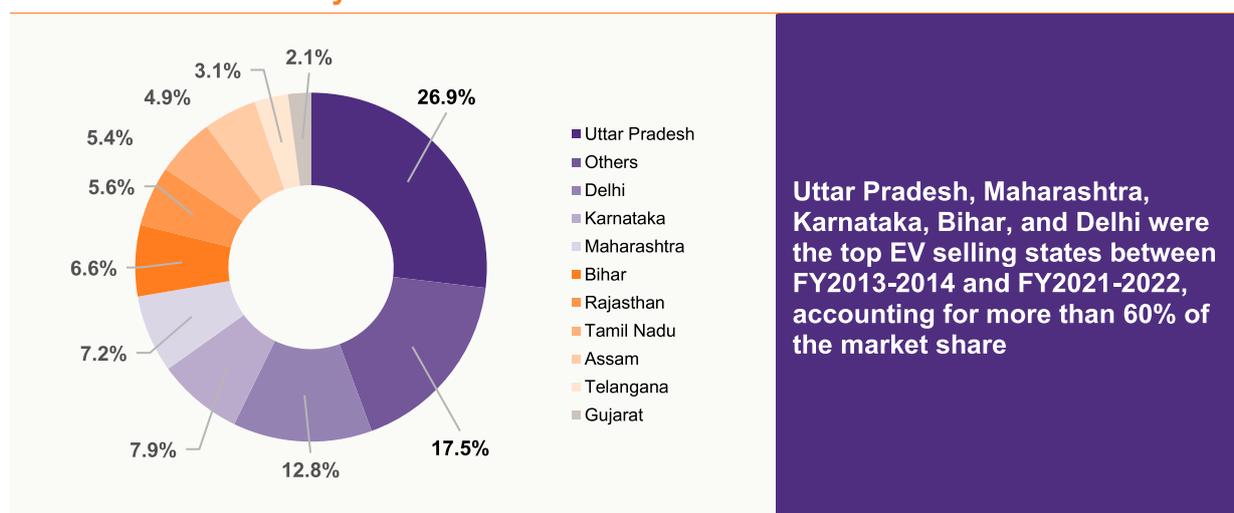


Figure 28: State-wise registered EV cumulative sales (till FY2021-22)

Source: JMK Research

Growth drivers

Government support

The Government of India has been at the forefront of framing policies related to EV adoption in the country. Few of the programmes launched by the government to increase EV adoption in the sector that are driving growth in the industry are –

- **FAME India Scheme:** Faster Adoption and Manufacturing of (Hybrid and) Electric Vehicles (FAME) was launched to promote growth and early adoption of hybrid and electric vehicles in the country. In the union budget FY2022-23, the government extended the scheme until 2024. FAME-II was also launched to support 1 million e-two-wheelers, 0.5 million e-three-wheelers, 55,000 e-passenger vehicles and 7,000 e-buses.
- **PLI Scheme:** The government introduced Production Linked Incentive for Advanced Chemistry Cell Battery Storage (PLI-ACC) scheme. The scheme is expected to boost India's battery infrastructure. The total outlay for the scheme is USD 2.45 billion, which would be disbursed to beneficiaries over five years once they set up a manufacturing facility.
- **Battery Swapping Policy:** In 2022, NITI Aayog released a draft battery swapping policy which will be valid until March 31, 2025. Battery swapping is a mechanism that involves exchanging discharged batteries for charged ones. The policy is targeted at supporting the adoption of battery-swapping, primarily for systems used in electric scooters and three-wheeler electric rickshaws²⁴
- **e-Amrit:** The government launched a website e-AMRIT at the COP26 summit in Glasgow, which will function as a one-stop destination for all information on electric vehicles. It addresses key concerns about the adoption of EVs, their purchase, information about investment opportunities, government policies, and available subsidies for drivers and manufacturers.²⁶
- **State-level subsidies:** The state governments are also actively providing incentives, which include-Capital Subsidy, Stamp Duty Exemption, Power Tariff Subsidy/ Electricity Duty Exemption, Capital Interest Subsidy, Debt Interest Subsidy for land and infrastructure, R&D and Patent grants, Infrastructure Subsidy-Land and land development costs, to list a few.

Private players entering the EV space

As revolutionary electrification technologies move closer to mass commercialisation, investors are encouraging the whole ecosystem of EV and are focusing on attractively priced higher value-add areas like charging solutions

Indian EV tech start-ups hit an all-time high in 2021, nearly reaching INR 3,307 crore across more than 25 deals, despite the pandemic. This amount is 255% higher than that of funds raised in 2020, and 12% higher than the pre-pandemic year 2019, when EV start-ups raised about USD 397 million.

For Q1 FY2022-23, equity funding of ~INR 5,233 crore (USD 658 million) was raised, more than double from the previous quarter. Biggest funding was raised by Ampere (a part of Greaves Electric Mobility) for INR1,750 crore (USD 220 million).

YTD, in FY2022-23 (July 2022), venture capital and private equity companies have invested INR 5,295 crore (USD 666 million) across 24 transactions in Indian electric mobility companies.

According to the report, Indian EV companies saw external investments jump eightfold to USD 1.7 billion in 2021 from USD 181 million in the previous year.

Adoption of newer business models

EVs are bringing disruptive business models to the forefront with technology as an enabler, acting as a catalyst towards the economic transformation caused by the Mobility Solutions. As EV ecosystem is a nexus of multitude of stakeholders, such as fleet operators, aggregator service providers, energy operators, e-commerce, coupled with Government and Private investments- strategic alliances among these stakeholders can create synergies.

²⁴ IBEF

²⁵ Indian Express

²⁶ India-Briefing

Few such business models (powered by EVs are):

- **First and Last Mile Delivery:** Electric Vehicles are excellent enablers for completing the value chain for public transportation by providing first/last mile delivery services. As E-3Ws have a lower lifecycle cost, EV adoption to provide first/last mile connectivity seems a better business choice, while being more sustainable. With the sales of Electric Three Wheelers (21,911 units) surpassing conventional ICE Three Wheelers (19,597 units) for the first time in May 2022, E-3Ws are clearly becoming a preferred choice. Various industries such as pharma, e-commerce, textile, FMCG, retail prefer e-three-wheelers as a last mile connectivity solution
- **Battery as a Service:** Battery swapping falls under the broader umbrella of Battery as a Service (BaaS) business models which involve users purchasing an EV without the battery, which significantly lowers upfront costs, and paying a regular subscription fee (daily, weekly, monthly, etc.) to service providers for battery services throughout the vehicle lifetime. BaaS is applicable for both fixed and removeable batteries and is the channel to implement swapping solutions. Benefits of Battery-as-a-Service business model include:
 - **Shift from capital to operational Costs:** A driver need not worry about finding an EV charging station nearby or the upfront costs associated at the time of buying. They can buy an EV without a battery which will save up to 30-50% expense, shifting the whole objective from a capital cost to an operational cost.
 - **Alleviation of range anxiety:** Directly alleviates Range Anxiety as the waiting time for charging the battery gets curtailed.
 - **Propelling faster EV Adoption:** This will facilitate interoperability within the EV ecosystem. Different manufacturers can now provide batteries that will be compatible with electric vehicles in the market, leading to wider penetration of EVs in India
- **Shared Mobility:** Shared e-mobility brings connectivity and automation, making mobility safe and seamless. With the Internet of Things (IoT), vehicles can become a part of real time information networks which will help commuters, service providers, as well as city planners to gather data and work upon enhancing rider experience as well as road safety. Shared Mobility opens avenues for real-time GPS tracking, vehicle vitals detection, risk profile analysis, as well as cloud connectivity. This model also gives daily commuters a chance to adapt to latest technologies, by opting for Vehicle Subscription Models and Rentals.

Comparison with global markets

In terms of EV sales globally- Norway (18.1 %), Iceland (5.5 %), Sweden (3.7 %), and the Netherlands (3.2 %) are leading in terms of the number of EVs sold compared to the total of all passenger cars on the road.

China, Germany, the EU, and the US are leading the way regarding pure sales volume. While EV is booming in some countries, it's still relatively marginal on a broader scale.

Related- electric mobility index:

The e-mobility index uses three key indicators to compare the competitive positions of some of the leading automotive sales markets worldwide: technology, industry, and market.

China and Germany are the countries at the forefront of the transition to electric mobility. China was the leading country for the technological development of electric vehicles, whereas Germany scored highest in terms of current customer demand.

After beginning to roll back subsidies for electric vehicles, China fell behind in terms of electric vehicle market size, although China was the world's largest automotive market in 2020. It is estimated that between three and 3.5 million electric vehicles were in use across China in 2019.

However, China is gradually resurging from the pandemic, and with its' economic activity picking up, the China Passenger Car Association has revised its EV Sales Projections (for PVs) for FY2021-22 from 5.5 million units to 6 million units. The forecast dwarfs expected FY 2021-22 EV sales for US (at 1.2 million) and Europe (at 0.1 million).²⁷

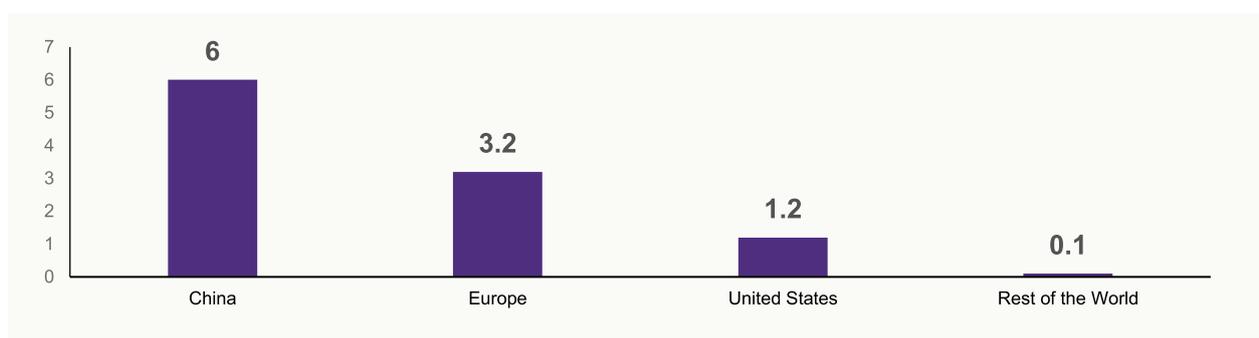


Figure 29: FY 2021-22 EV Sales for Passenger Vehicles (in millions)

Key drivers for EV growth globally:

- **Green mandates:** More than 20 countries have announced bans on the sales of ICE Vehicles, or mandated new sales to only include zero emission vehicles. Additionally, approximately 127 countries (including India) are adopting net-zero emission targets.²⁸
- **Stronger incentives:** With Europe leading government support in form of purchase incentives (a total of USD 14 billion offered globally), China also delayed subsidy phase out to promote the EV sales.
- **Cost reduction:** The cost of running an electric vehicle being lower than ICE has been a huge factor in enabling EV sales. With the battery prices reduced to USD 100/kWh milestone in some cases; coupled with price cap-based subsidies, EVs become a cost-effective alternative.
- **Expansion of charging infrastructure:** The EV Segment experienced a 45% Y-o-Y growth in public charging infrastructure in FY2019-20, thus enabling the ecosystem for conducive growth. – China had more than 1.1 million publicly accessible electric vehicle chargers in 2021, accounting for over 65% of such chargers in the world.
 - On average in 2021, the EU offers five fast public chargers for every 100 km.
 - In the US, Bipartisan Infrastructure Law (BIL) provides USD 7.5 billion to develop the country's EV-charging infrastructure. The goal is to install 500,000 public chargers—publicly accessible charging stations compatible with all vehicles and technologies—nationwide by 2030.

²⁷ Bloomberg Report

²⁸ International Energy Agency (Stated Policies Scenario), LMC Automotive, Technavio

Challenges faced

Battery safety and quality

EV batteries are, by and large the most important component of an EV, accounting for 40% of vehicle costs. A lithium-ion (Li-ion) battery is an advanced battery technology that uses lithium ions as the main component. Thermal Management in the EV battery is of utmost importance since it regulates the vehicle temperature and enables it to operate in extreme weather conditions.

There have been a few recent incidents which have brought battery safety under question, necessitating stringent testing and safety norms for batteries. The first step towards ensuring safety and quality is to implement standardisation in manufacturing and testing, to eliminate/reduce anomalies.

To implement standardisation and quality control over battery safety and quality, the Bureau of Indian Standards (BIS) is defining performance standards for lithium-ion batteries to safeguard consumers. The standards will incorporate the test procedures for performance, reliability and electrical functionality for battery packs and are harmonised with 'ISO 12405-4:2018' standards.²⁹

EV financing

Banks as well as NBFCs currently hesitate to lend for EVs due to asset and business model risks. As a result, EV buyers cannot obtain interest rates and tenures comparable to internal combustion engine vehicles if financing is available.

Asset risks

- **Technology risk:** Extremely high upfront cost, which slows adoption
- **Policy risk:** Lack of awareness on the details of national and state-level policies, and challenges accessing incentives result in increased risk perception around EV Financing.
- **Manufacturer risk:** Lack of local supply chains for parts and components used for manufacturing EVs and EV batteries creates barriers for local manufacturing.
- **Resale risk:** EVs have a reduced resale value due to nascent ecosystem and a lack of secondary market (except for segments like e-rickshaws where the secondary market exists, it is highly unstructured)

Business model risks

- **Operations and maintenance risk:** Operational aspects of EV use- such as battery replacement, voltage fluctuations, or technical requirements of changing infrastructure- are yet to be understood in India. The vehicle's lifecycle may be shortened by a lack of awareness around maintenance requirements and patterns, reducing bankability.
- **Utilisation risk:** Infrastructure issues include lack of available land where charging infrastructure can be installed, intensive cost of purchasing and installing EV charging equipment and ensuring stability of grids in those areas. **In short, EVs have high capital cost with low operating expenses, as opposed to ICE, where fixed costs are lower and variable costs are higher.**

Ecosystem challenges

- **Operational and logistics costs:** The vehicle financing Industry is composed of small financial units run mostly through small branches in India. They lack synergies, standardisation in operations, and rely on manual labour to collect loans.

- **NBFC liquidity issues:** Post the bankruptcy of Infrastructure Leasing and Financial Services (IL&FS) in 2018, the NBFC sector has been facing a liquidity crunch, leading to tightened funding for vehicle financiers, prompting reduced lending and increased risk aversion in the sector.
- **Varying degree of risks with various segments and use cases:** Risk differs and varies as per the vehicle type and the utilisation requirements (whether for personal use or for business purposes, like for delivery and cab services)

Key challenges which arise because of these risks include

- **High interest rates:** Interest rates of 20% or more (two times of petrol diesel vehicles)
- **Low loan-to-value ratio:** Down payment between 25% and 50% for EVs, including capital intensive e-buses
- **Short-term tenures:** Tenures shorter than ICE vehicle loans by several months, increasing the Equated Monthly Instalment (EMI).
- **Limited financing options:** Few dedicated EV loan products outside of e-rickshaw loans and SBI's Green Car Scheme.

Adequate evolution of charging infrastructure- Leading to range anxiety

The charging infrastructure is the backbone of electric mobility but is also one of the key perceived barriers to EV adoption in India given its limited availability and long charging times.

India is picking up the pace in setting up the charging infrastructure but not as much as is there in other regions like European Union (EU), USA or China. High operating cost, Discom load, and the uncertainty related to utilisation rates of charging stations are holding back the charge operators from expanding their current reach.

The adoption of EVs saw a significant rise in the country between FY2019-20 and FY2021-22, with EV sales rising 155% year-on-year to 4,29,217 units in FY2021-22, as per Federation of Automobile Dealers Associations' (FADA) data. However, the number of operational public charging stations in the country stood at 1,640 as of February 2022, a rise of only 77%, or 713 charging stations, from June 2020, as per the Ministry of Power's data.

Few factors which can help expediate the growth of charging infrastructure include:

- **Segregation of big players/stakeholders from start-ups:** The government is currently keeping big players, like Tata Power and Energy Efficiency Services Limited (EESL), and smaller start-ups in the same bucket while coming up with new policies or mandates, which is not ideal for both the set of players.
- **Need of raising awareness and enhancing ecosystem:** To sustain and promote EV demand, there is a strong need to incentivise players to set up stations in neighbourhood localities like residential apartments, commercial complexes, shopping malls, etc. along with government and utility companies playing the role to set up large charging stations across state and national highways to prompt people to buy EVs.
- **Need for a uniform growth:** The government highlighted that 678 public EV charging stations were set up in these nine cities between October 2021 and January 2022, an impressive 2.5 times jump from the earlier numbers provided by it. However, it also means that only 35 charging stations were set up in the entire country between June 2020 and February 2022, leaving that four-month period. This creates an imbalance in growth of public charging facilities at a national level.

Customer resistance – Limited models and high upfront costs

While the cost of operating EVs is lower than ICE (as it is offset by low fuel costs, running and maintenance costs, as well as incentives), EVs require high upfront costs, which becomes a huge deterrent in for buying electric cars.

Coupled with that, there are fewer players in the market for E.V Options. While 2-W Segment still provides some options, there are only 4-5 mass electric cars in India and 5-6 in the luxury segment, with additional options to be launched in the coming years. On the other hand, ICE Vehicles provide a plethora of options (in terms of design, features and customisation requirements), making it more attractive for customers.

In the last 2 decades, the automotive industry has seen cutting edge technology, higher convenience functionalities, improved vehicle security, increased digitisation and electrification of car components, etc. All this is driven by the integration of wireless communication and GPS based technology in automobiles. This revolution, dubbed as Telematics, has brought an intriguing array of in-car services that have improved the driving experience, set new lifestyle requirements, raised brand awareness, and improved customer experience.

Rise of telematics in India

In the last 2 decades, the automotive industry has seen cutting edge technology, higher convenience functionalities, improved vehicle security, increased digitisation and electrification of car components, etc. All this is driven by the integration of wireless communication and GPS based technology in automobiles. This revolution, dubbed as telematics, has brought an intriguing array of in-car services that have improved the driving experience, set new lifestyle requirements, raised brand awareness, and improved customer experience.

The technological evolution of telematics in India has been in line with telematics journey of other countries with five distinct phases, all of which are characterised by ongoing improvement.

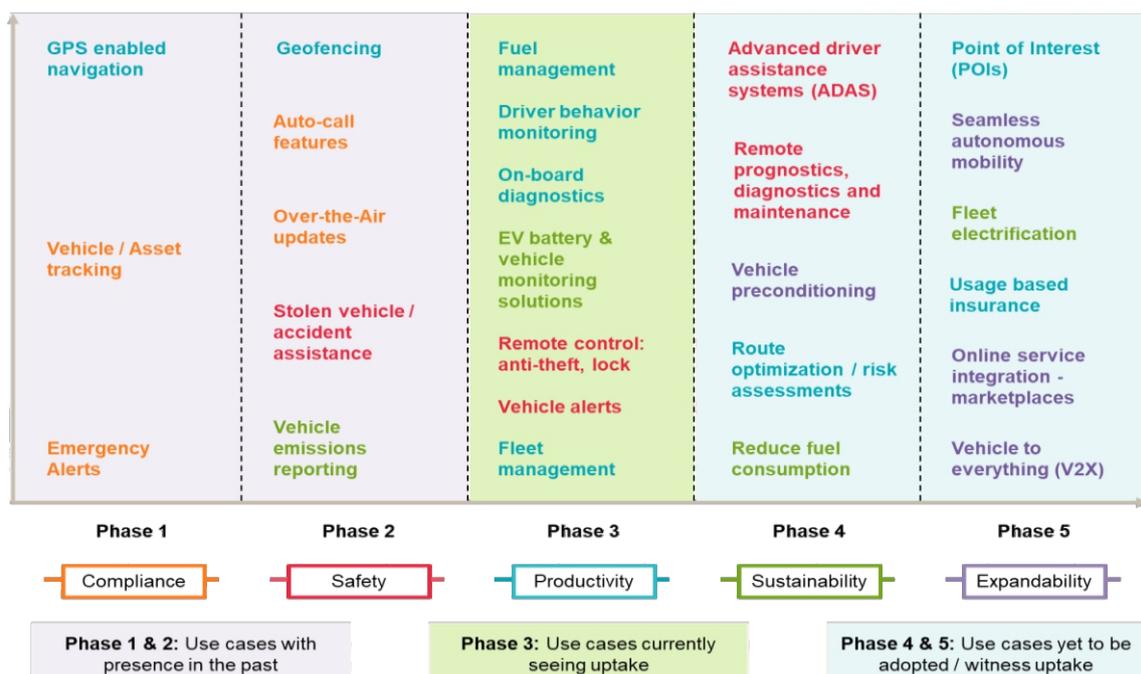


Figure 30: Technological evolution of solutions and their use-cases in India

Note: The above list is not exhaustive, there are other telematics applications across the five phases and use-case buckets.

India has just entered Phase 3 of this evolution with OEMs offering complete vehicle connectivity through embedded sims for enabling solutions.

The Indian telematics market has only been exposed to basic telematics services such as GPS-enabled navigation and vehicle tracking systems. Telematics adoption has been very less in the passenger cars and trucks (due to large number of single truck owners for whom installing high-cost telematics would affect margins as compared to fleet owners) as compared to commercial vehicles, taxi companies and fleet operators. However, the usage of telematics in the Indian automotive industry has shown a positive trend in the recent years.

Over the previous decade, basic in-car entertainment, navigation, and in-car networking (for example, via Bluetooth) have progressed significantly and are an incumbent part of OEM offerings for PVs. Advanced telematics capabilities that use car sensor data, driving behaviour, and vehicle-health characteristics are also growing, but they have yet to gain widespread popularity among private car owners. The segment is picking up and expected to register the largest growth owing to consumer appetite for advanced technologies, and renewed focus of OEMs and telematics service providers to deliver the same. The two-wheeler segment has yet to make a large impact on the Indian telematics market owing to limited capability for telematics in terms of device size and cost.

The drivers behind the global adoption of telematics are majorly commercial and regulatory. This is mirrored in the Indian telematics market but at a conservative capacity. In India, the focus remains on telematics fitments in public vehicles for regulatory compliance of AIS-140.

Despite its current low penetration in India, there is immense growth potential for telematics in India. One major driver for the uptake of telematics solutions has been the mandated vehicle tracking and emergency panic button in public transportation vehicles and cabs as per AIS-140. This paved the way for mass fitments of devices and for multiple device manufacturers to be certified and be a part of the ecosystem. Similarly, the shift to BS-VI led to more embedded telematics fitments in vehicles for monitoring the increasingly complex engine and for real time emission reporting. Further, the government's announcement to make India free from toll plazas by 2023, with money for tolls being deducted through a GPS tracking system installed in the vehicle will provide impetus for the telematics industry in India.

Besides, other factors driving the growth of telematics in India are:

- Increased awareness of customers on larger benefits and reduction in cost of vehicle ownership
- Increasing adoption in PV space in line with developed markets
- Increased EV uptake across vehicle segments
- Insurance premium incentives

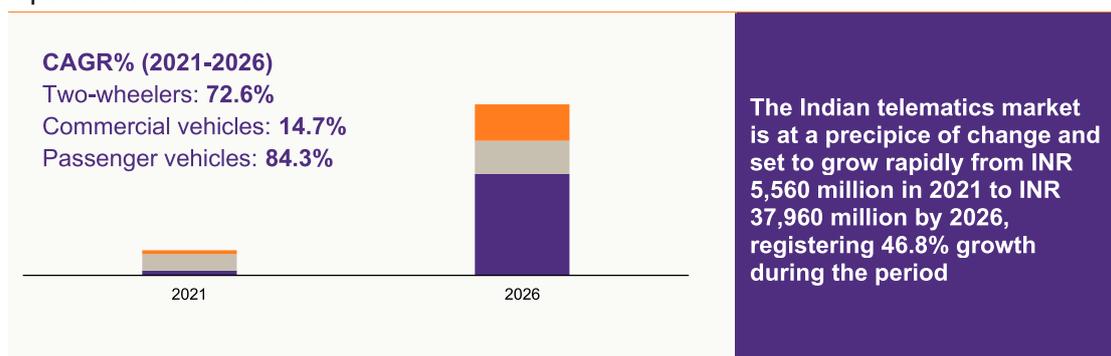


Figure 31: Telematics market size in India (INR million)

Source: GT Analysis

With a shift in growth segments and OEM focus on solutions with more system applicability, the market drivers in this decade will be:

- **Regulatory implementation of AIS-140 in the remaining states:** The CV segment growth will be largely driven by the continued and homogeneous implementation of AIS-140 in the public transportation vehicles in remaining states, who had deferred the implementation owing to reasons such as COVID-19.
- **The evolution of use cases is expected to shift towards the PV segment:** Telematics solutions in India are currently merely providing real-time location of vehicles and some fleet management solutions. A change can be noted from simple, plain track-and-trace solutions to much more improved on-board diagnostics devices such as OBD II (implemented based on ISO 15031 standard) based solutions. These devices can be used to monitor driving behaviour as well as to detect any potential problems with the vehicle which increases OEM level adoption for these solutions.
- **Increased EV uptake:** While EV vehicles currently are fitted with telematics devices, there is limited mobilisation of the data and customer focused insights. The newly evolving use cases are expected to improve battery management and provide charging information. Given the high interest and acceptance seen from young customers towards electric vehicles, this will drive greater telematics technology knowledge proliferation. NITI Aayog targets 80% EV penetration in the two-wheeler segment by 2030 which will be a huge driver for the growth of the two-wheeler segment.

Current dominance of telematics in Indian CV industry

Commercial vehicle telematics is the dominant segment in the Indian telematics market, currently being driven majorly by regulatory telematics fitments in public transportation vehicles.

MoRTH has taken measures in the right way by introducing the AIS-140 regulation. While the process began in 2014, initially driven by the necessity to bring in safety measures in public transport, the rule took official shape only in May 2017. Since then, many device and auto-parts manufacturers have started working to develop AIS-140 issued devices, and presented them for certification.

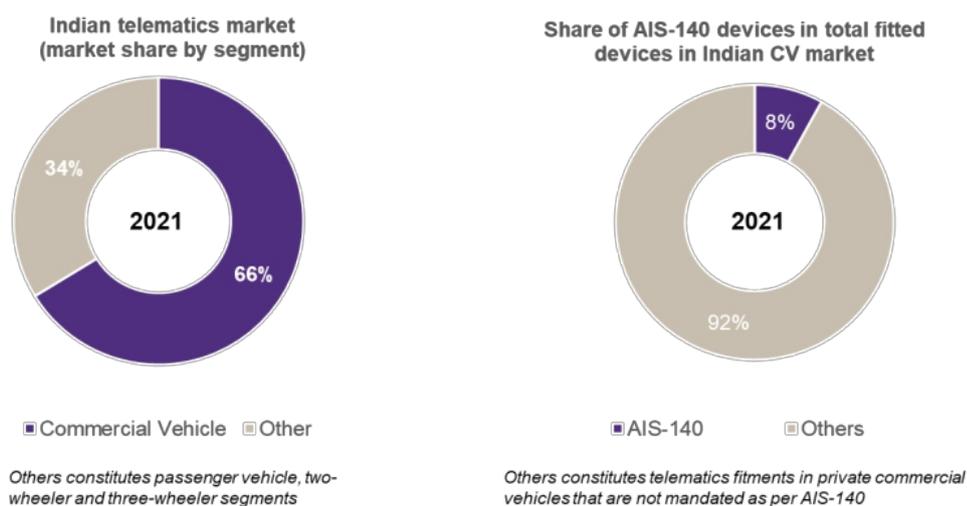


Figure 32: Dominance of commercial vehicle segment in Indian Telematics market

Source: GT Analysis

The CV telematics market makes up ~66% of the total Indian market and was valued at INR 3.68 billion in 2021; it constitutes ~ 0.45% of the global CV telematics market. The total telematics installed base in commercial vehicles is approximately more than 2mn fitments.

Further, COVID-19 has led to the growing adoption of commercial telematics in the logistics sector due to the surge in e-commerce sales.

The OEMs operating in India are entering partnerships with telematics players to offer integrated fleet management solutions for logistics.

Telematics offerings in CV segment in India				
Navigation	Fleet Management	Vehicle Management	Safety and Security	Others
<ul style="list-style-type: none"> Real time tracking Geofencing SMS Alerts & Queries 	<ul style="list-style-type: none"> Trip Management Vendor management Driver Analysis Report Generation 	<ul style="list-style-type: none"> Remote Unit Management Maintenance Reminders 	<ul style="list-style-type: none"> Anti theft alerts 	<ul style="list-style-type: none"> Planning Mobile App connectivity Infotainment and Passenger Info System for buses
<ul style="list-style-type: none"> Real Time Tracking Geofencing SMS Alerts 	<ul style="list-style-type: none"> Driver Analysis Report Generation 		<ul style="list-style-type: none"> Anti theft alerts Collision Warning Systems in school buses 	<ul style="list-style-type: none"> Infotainment and Passenger Info System for buses
<ul style="list-style-type: none"> Real Time Tracking Geofencing SMS Alerts 	<ul style="list-style-type: none"> Driver Analysis Report Generation 	<ul style="list-style-type: none"> Remote Unit Management Maintenance Reminders 	<ul style="list-style-type: none"> Anti theft Immobilizer Emergency SOS button Driver Assistance System 	<ul style="list-style-type: none"> Mobile App connectivity Infotainment and Passenger Info System for buses
<ul style="list-style-type: none"> Real time tracking Geofencing SMS Alerts & Queries 	<ul style="list-style-type: none"> Driver Analysis Report Generation 	<ul style="list-style-type: none"> Maintenance Reminders 	<ul style="list-style-type: none"> Anti theft alerts Fire Detection and Suppression System for buses 	<ul style="list-style-type: none"> Infotainment System for buses

Figure 33: Telematics offerings in CV segment in India

Demand for telematics in the CV segment is driven by need for fuel efficiency, advancement of logistics and e-commerce in India, need for cargo and vehicle safety, rise in transit losses and policy support for enablement of safety in public transport.

Differences in global telematics vs Indian telematics market

The global telematics market is currently valued at over USD 86 billion and has been growing at a CAGR of 18%. The Indian Telematics market currently makes up ~ 0.08% of the total global market and is valued at USD 70 million

- The value creation potential of telematics solutions is low in India as compared to global markets, such as North America and Europe since adoption has been very low in passenger cars and trucks. Globally, OEMs and customers are seeing the value creation potential in telematics across levers like car attractiveness, internal usage (reduction in quality & consumption costs), aftersales (preventive repair and maintenance) and connected services (convenience, value add services like User based insurance - UBI, Over the air updates – OTA, etc.). This potential is yet to be realised in India as compared to global markets.
- The drivers behind the global adoption of telematics are majorly commercial and regulatory. This is mirrored in the Indian telematics market but at a conservative capacity. Regulatory initiatives relating to safety and security have made a decisive impact on the adoption of telematics in Europe – For e.g. the EU's eCall initiative and Russia's ERA-GLONASS have mandated that all new car models sold include an automatic emergency call device. Commercial services in North America have driven the adoption of OEM telematics services, which have evolved from a differentiator to a mainstream feature now offered by majority of the leading car brands on many of their models, owing to consumers' increasing appetite for greater connectivity and intelligence in their vehicles. In India, the focus still remains on telematics fitments in public vehicles for regulatory compliance of AIS-140.
- OEM fitment of telematics is higher globally, as compared to India: Several categories of car telematics applications are offered on a commercial basis by most leading carmakers globally.

Examples include roadside assistance, stolen vehicle tracking (SVT), vehicle diagnostics, connected navigation and infotainment, Wi-Fi hotspots, concierge services and convenience applications. OEM fitments in India have majorly been limited to track & trace, mainly due to high price elasticity. Even though versions of global solutions are offered by Indian OEMs and telematics service providers (TSPs), an increase in the vehicle price can cause volumes to fall dramatically in a cost-centric market like India.

- Development of value-add services using telematics applications is more prevalent abroad owing to integration of all stakeholders in the ecosystem. Several other applications of telematics also exist globally, for instance usage-based insurance, leasing and rental fleet management as well as electronic toll collection and road charging. Global carmakers are also gradually exploring in-vehicle commerce platforms and data exchanges to offer telematics data to third-party service providers. While these opportunities have been discussed in India, there is a long road ahead in their implementation which requires major strides from all stakeholders in the Indian telematics ecosystem.

Telematics ecosystem

The telematics ecosystem can be divided into three layers: services for end users (both vehicle-independent and vehicle-centric), the infrastructure enabling delivery of those services and the stakeholders who manage them.

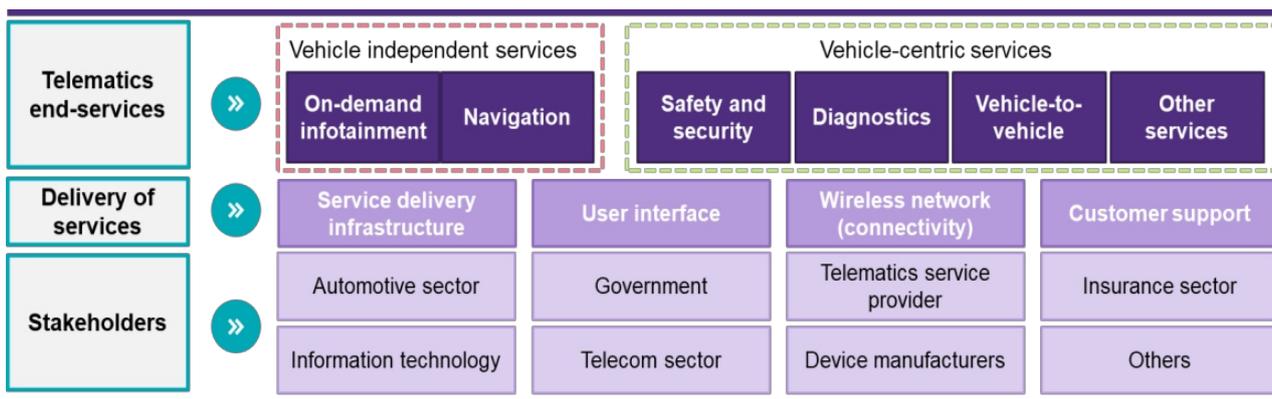


Figure 34: Telematics ecosystem in India

Telematics service providers: The Indian telematics manufacturing ecosystem has over 100 certified local and national device manufacturers. There are end-to-end solution providers with complete in-house software and hardware development and manufacturing, or solely hardware / software focused players, or PV/CV segment focused players in the market as well. These TSPs collaborate with OEMs on specifications of devices for their vehicles.

OEMs can combine different types of hardware accessories, software, and mobile apps for increased efficiency and visibility into organisational processes thus creating wider use cases for telematics solutions which are driving OEM adoption of telematics. Additionally, they are also able to strengthen their customer understanding and capabilities by leveraging telematics data. Over-the-air updates and diagnostics features are helping to build their after-sales service offerings.

Connectivity Supply: A key functionality of a telematics device is communication of data collected to be further analysed by stakeholders for insights and enable applications. This communication is facilitated by telecom players. Seamless supply of connectivity services enables telematics devices to function at their optimum capacity, reduces latency in data sharing, and creates opportunities for more device applications. In India, currently the minimum mandated network is 2G.

IT/tech companies: The increasing focus on telematics data has illuminated the foremost step as selection of the proper cloud service with storage and accessibility solutions becomes important to develop further applications for customers. Further, the integration of more intelligent systems in telematics also requires the intervention of IT infrastructure and service providers. A key role is that of a system integrator, governing the deployment-to-operation lifecycle and specialising in bringing together component subsystems into a whole and ensuring that those subsystems function together.

Government: The Government has/will be a key stakeholder for the historical / future growth of telematics in India. With favourable policy making to boost the manufacturing ecosystem, introduction of industry standards and mandates, comprehensive testing and certification norms to ensure device safety, they have been instrumental in standardising the ecosystem and driving adoption so far. Additionally, they are also able to derive benefits from telematics technology in terms of increased road, passenger safety and visibility of public transportation vehicles. The implementation and advancement in scope of AIS-140 will enable benefits such as better utilisation tracking and resource maximisation of public fleets, streamlined emergency response, improved emissions, safer driving habits and asset security.

With the increase in applicability of telematics in various use cases such as insurance, in-car infotainment and advertising, the ecosystem has widely evolved to involve diversified competencies and new non-traditional stakeholders.

Although the telematics market in India is still in the nascent stage, there is a strong growth rate expected due to the increased demand for fleet management and other basic telematics services.

Future development of the telematics ecosystem in India can have some impediments owing to the current market challenges that are faced by various stakeholders. Regulatory intervention is required for the integration of all the current automotive and non-automotive stakeholders, and the extended ecosystem players who will arise from the mobilisation of telematics data. The increasing electronics in vehicles from telematics fitments also calls for more stringent cybersecurity engineering practices across the entire value chain to combat threats such as consumer data breaches or vehicle thefts and ensure physical safety in connected cars. There is a need to strengthen regulations such as those pertaining to component level specifications, telecommunication modules, etc. to address the white spaces and pave the way for further mandates.



Key challenges faced by the sector

Mismatch in semiconductor supply chain

Semiconductors or chips used in vehicle manufacturing may seem a small component, however, is a prerequisite for manufacturing. It takes almost two months to make one chip and it goes through several stages before it can be installed in a car or an electronic item. On top of it, there are not many manufacturers who make semiconductor chips in the world. As the pandemic hit the world, a disruption in semiconductor supply chain emerged.

The reasons behind disruptions were:

- Pandemic-induced lockdowns which hampered cross-country supply chain
- With the demand for automobiles picking up gradually and accelerated usage of Semi-conductors in vehicles for new and improved features such as Vehicle Electrification, Connectivity, Driving Assistance, Vehicle Safety, etc. the **demand for semi-conductors witnessed a huge rise. Global chip sales rose to 26.2% in 2021, sharply above the projection of 6.3% made in late 2019**³⁰. by the Semiconductor Industry Association (SIA). Thus, the industry needed some time before it could streamline its supply with accelerated demand requirements.

With slowdown in the supply of semiconductor chips, vehicle manufacturing was impacted. The manufacturing of semiconductors requires large amount of capital and has an average gestation period of 6-9 months. Moreover, it has a long production cycle of about 18-20 weeks. In India, as of December 2021, the carmakers were sitting on the books of seven lakh pending orders. For the Indian and international market, the average lead time has been around 14 weeks.

The semiconductor business is capital-intensive, with long gestation periods. Manufacturing capacity gets added in chunks, while demand picks up slowly. This leads to a build-up of inventory, which is subsequently followed by a downturn.

However, the Covid related shutdowns which impeded global logistics and supply merely amplified the structural shortcomings owing to mismatch in automobile and semi-conductor supply chains. The market for semiconductor chips in automobile industry is quite vulnerable, with a few companies holding a reasonable market share. It's time to revamp the business model, and for automobile companies to reconsider the long-term procurement strategies for semi-conductors. Meanwhile, markets such as Taiwan, Japan, and South Korea have witnessed investments to increase capacity, which may result in supply chain improvements by the end of this year.

The Indian Government announced the Semicon India Program in December 2021 and cleared an INR 76,000 crore scheme to boost domestic semi-conductor production. Recently, the Ministry of Electronics and Information Technology has formed a committee to promote the vision of making India a global leader in semi-conductor manufacturing, design and innovation. Though it's a step in the right direction, but dependencies on semi-conductor imports will not shrink in the short to medium term for India.

Automotive cybersecurity

With the growth in connected cars, there has been an astronomical increase in the data privy to cyber-crimes. **The frequency of cyber-attacks on cars has increased by 225% from 2018 to 2021**³¹. With the connected car market on the cusp of growth in India, ensuring effective automotive cybersecurity is the need of the hour.

30 Mint

31 Upstream's 2022 Global Automotive Cybersecurity report

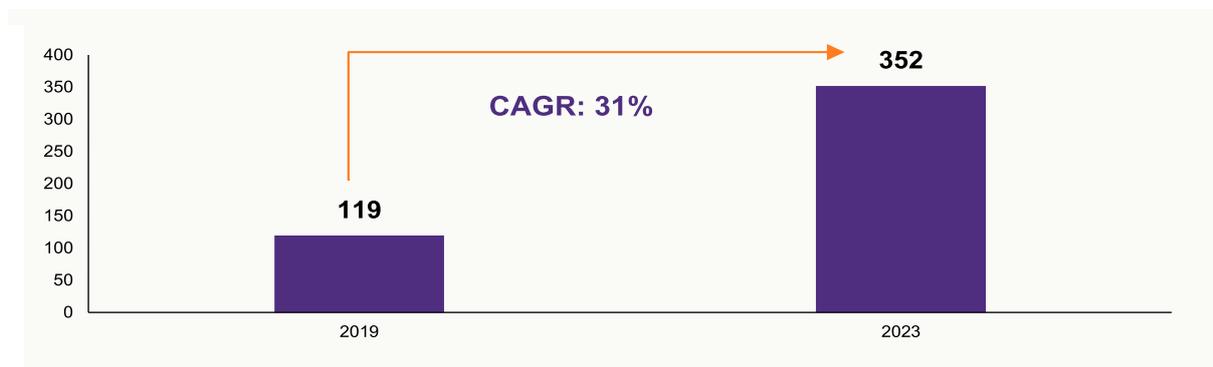


Figure 35: Comparison of Connected Cars Volumes between 2019 and 2023

The first two months of 2022 reported more cybercrimes than the entire 2018, evidenced in the CERT-In data. With these statistics, car makers need to go the extra mile to gain consumer's trust and ensure vehicle safety. In a recent automotive study conducted by IBM, 62% of consumers said that they would consider a brand which ensures better data security and privacy.

Best practices which can be taken up by automotive players are:

- **Allocation of a dedicated team focused on cybersecurity**, to ensure timely and effective organisation-wide cybersecurity governance
- **Conducting gap-assessment**, to analyse if the best practices pertaining to automotive cybersecurity, such as incident response, collaboration, governance, risk assessment and management, awareness and training are being followed. Dedicated resources and pro-active intervention, wherever a gap is recognised can go miles.
- **Awareness and training sessions**, for specifying and communicating cyber security standards and best practices to ensure data privacy with internal and external stakeholders.

Pressure on entry-level vehicle segments

The entry-level vehicle segment has been affected by the increased cost of acquisition in recent years due to multiple factors such as increased acquisition cost, regulatory requirements (BS-VI emission norms), taxation and commodity price hikes. For entry-level segment vehicles, the elasticity of demand is quite high with respect to prices, and this has led to a negative growth in this segment.

The market for entry-level hatchbacks in India has decreased significantly over the past few years as rising prices and relative economic hardship have discouraged consumers in the "low-cost vehicle" buying segment, while at the same time the market share of more expensive cars has continued to rise on the back of "resilient incomes" and less sensitivity to price increases among "affluent buyers".

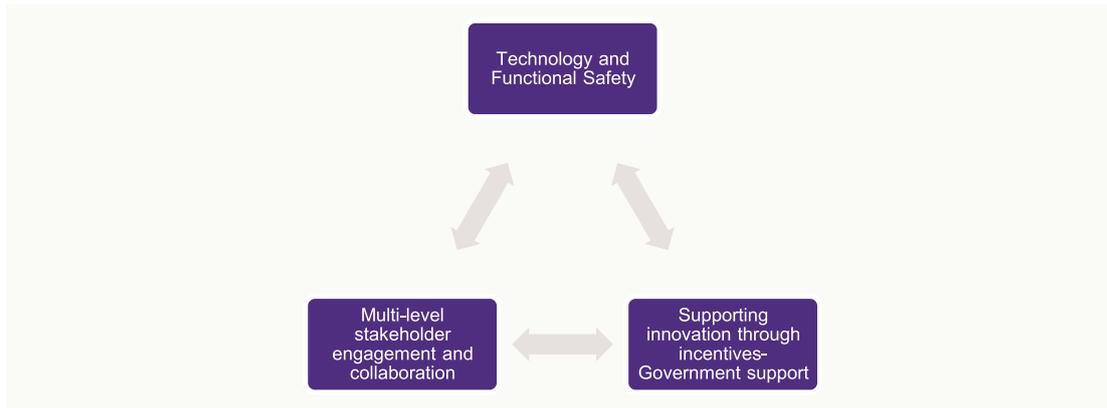
In India, which has been touted as the small car market, the sales of the entry-level hatchback segment are largely driven by first-time users. With the COVID-19 pandemic impacting the income sentiment significantly for entry-level car buyers, purchases and upgrades have been getting postponed.

The trend also reflects a shift in priorities for vehicle makers increasingly focusing on premium offerings to maximise margins at a time supply constraints and high commodity prices are keeping production levels sub-optimal. Prices of precious metals such as rhodium, palladium and platinum are still significantly higher compared to a year ago, even after recent softening. This could keep margin pressure high on automakers, who may need to pass on the effect of commodity inflation to customers in the form of further price hikes.

Further, the industry was kind of struggling with its own issues like chip shortage, commodity Inflation and more, but with now interest rates moving upwards can overshadow the one already under pressure.

Higher interest rate means higher EMI and it also shrinks the purchasing power of customers and dents the sentiment as well. Entry level car segment has more of a threat as over 80% of cars here are purchased through various financing options.

The three pillars which will help in overcoming these challenges can be outlined as technology and functional safety, government support and multi-level stakeholder engagement- from infrastructure, electric mobility, to public-private partnerships and more.



(Three-pillar approach to boost the Indian Automotive Ecosystem)

The sector is a significant contributor towards India's vision to becoming a USD 5 trillion economy.

With the introduction of newer business models, and the growth of allied industries, such as FMCG, e-commerce, e-pharma and subscription services, the automotive sector continues to support connectivity and economic growth in more ways than one.



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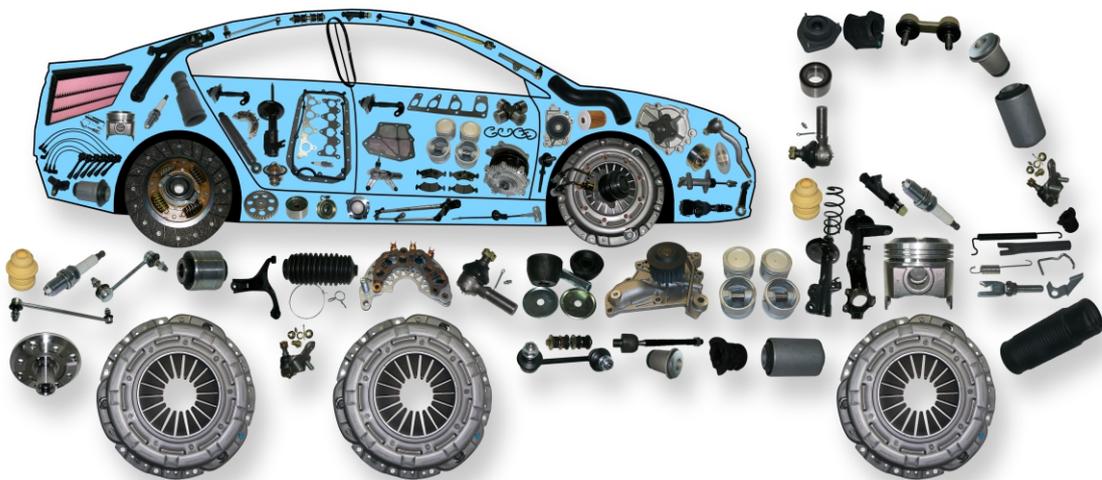


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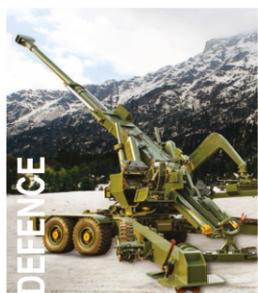
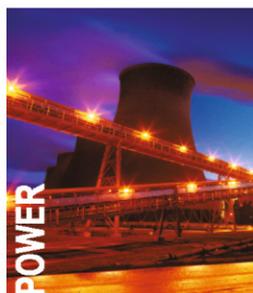


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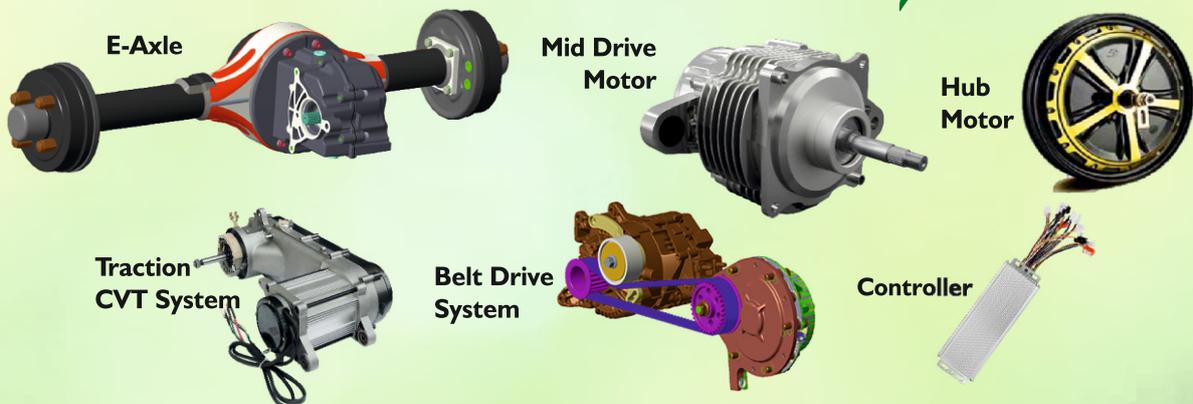
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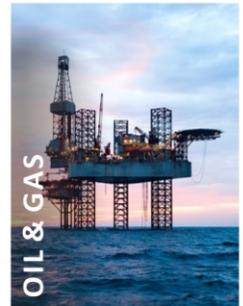
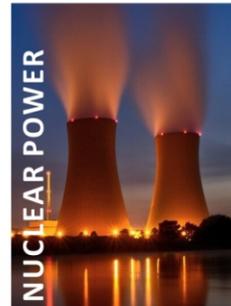
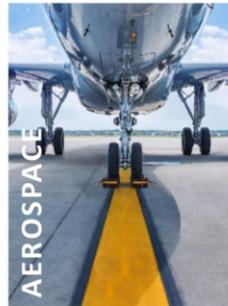
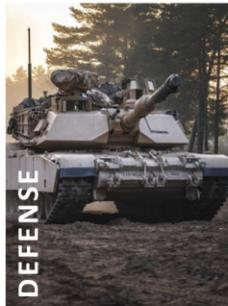
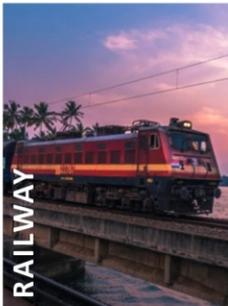
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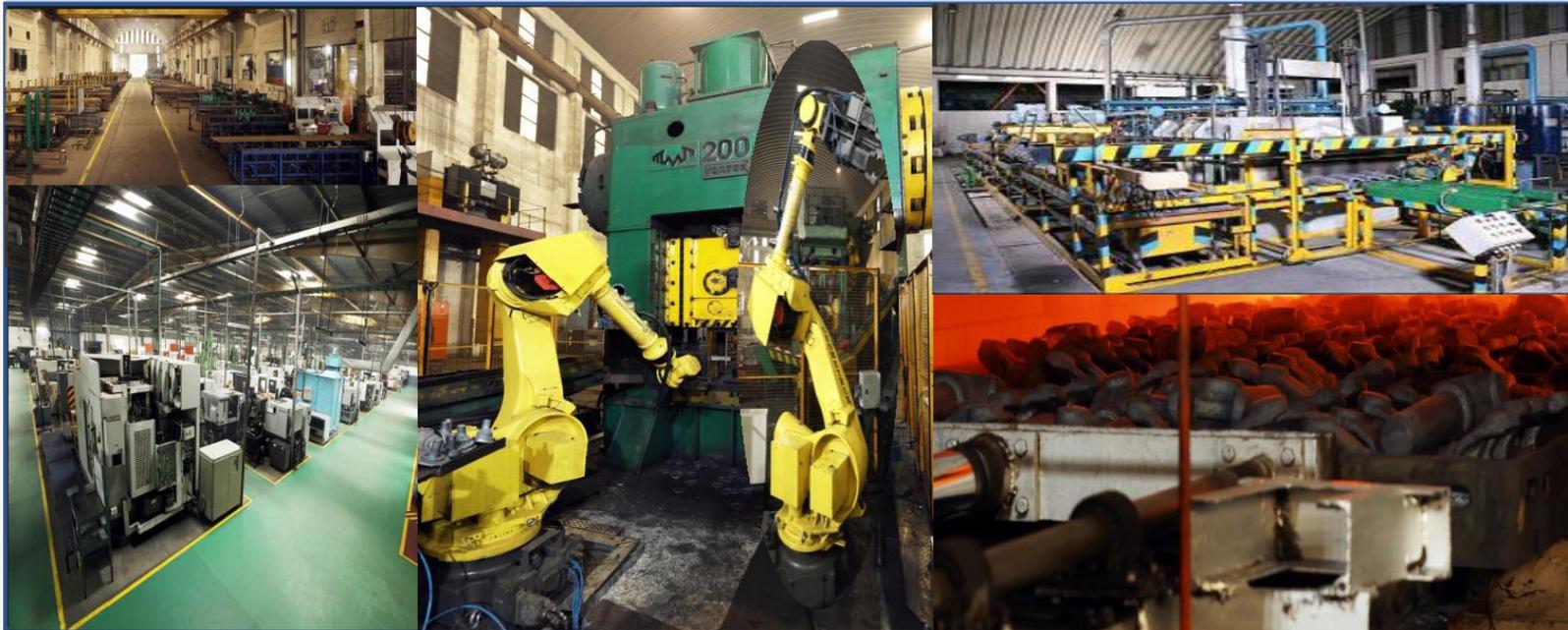
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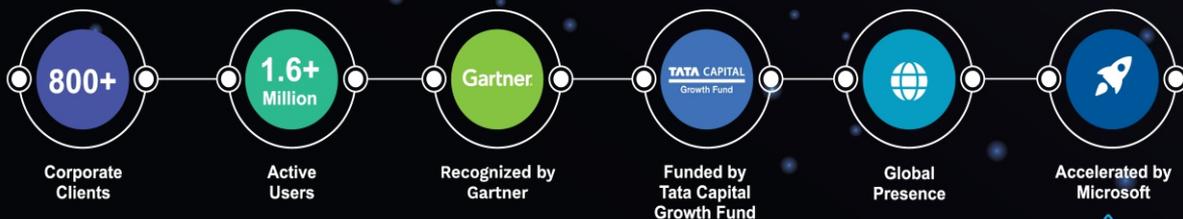
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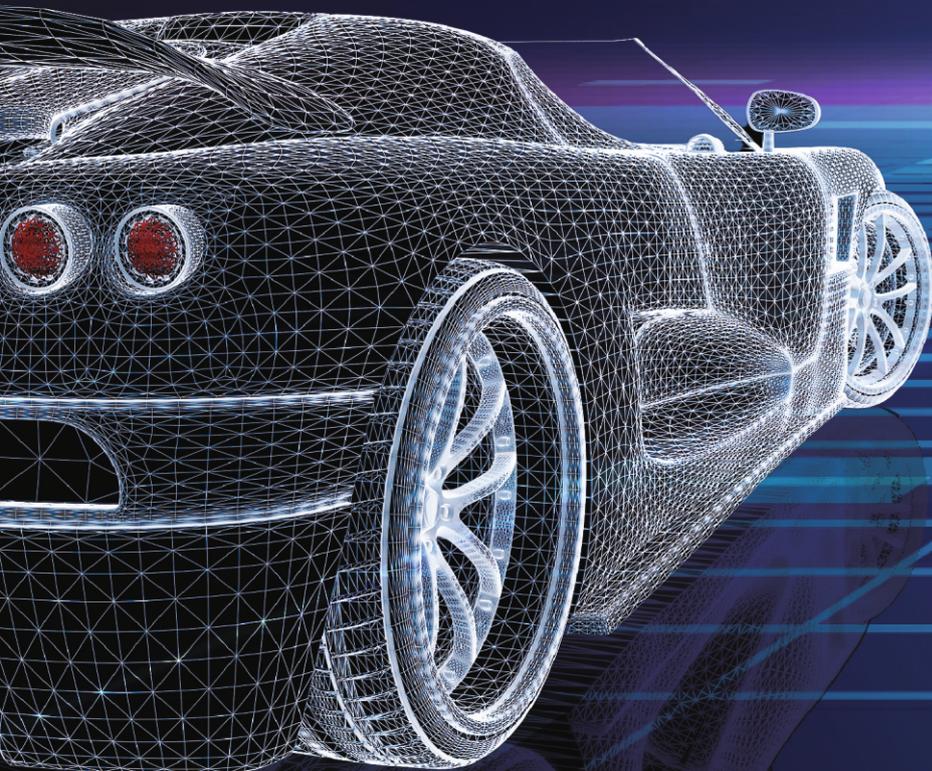
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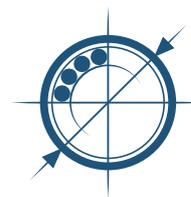


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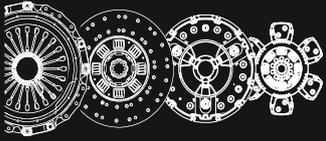


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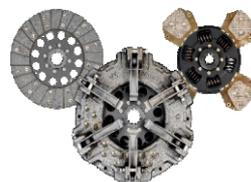
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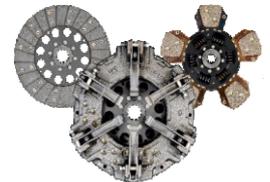
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