



Indian Automobile Industry



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1. Executive Summary

The automotive industry is a pillar of Indian economy and a key driver of macroeconomic growth and technological advancement. Currently, the automotive industry contributes more than 7% to the total GDP and provides employment to about 32 million people, directly and indirectly. Strong domestic demand coupled with supportive Government policies have led to the Indian automotive industry climbing up the ranks to be one of the global leaders.

Just like many other countries, The Indian auto industry is set to witness major changes in the form of electric vehicles (EVs) and Intelligent Transport system (ITS) with aims to alleviate existing concerns including traffic congestion, fuel dependency, air & noise pollution etc. In March 2016, the Government of India (GoI) set the country's ambitious target to have of 100% electric vehicles (EVs) fleet on road by 2030. Keeping in mind, the government of India has been taking various initiatives to promote faster adoption of electric vehicles. These include the [National Electric Mobility Mission Plan \(NEMMP\)](#), [Faster Adoption and Manufacturing of \(Hybrid &\) Electric Vehicles in India \(FAME India\)](#) and schemes such as [Green urban transport and urban green mobility](#) that promote e-mobility in public transport. With that, the [AMP 2016-26](#) has set out clear targets for propelling Indian Automotive industry amongst the top three nations in the world by 2026 where the focus will be on developing value-added components and not just conduct plain vanilla manufacturing.

Subsequently, multiple state governments have been providing incentives to attract electric vehicle (EV) manufacturing in their states, and to fast-track adoption of EVs. Karnataka became the first Indian state government to introduce an Electric Vehicle Policy. It has launched its Electric Vehicle and Energy Storage Policy in 2017. The government of Maharashtra, Andhra Pradesh, Telangana, Uttar Pradesh and Uttarakhand have also either unveiled electric vehicles policy or are framing draft policies to support GoI's vision to have 100% Electric Vehicles by 2030.

In May 2017, the National Institution for Transforming India (NITI) outlined a vision for the transformation of mobility in the country, proposing a set of actionable and specific solutions to accelerate India's leadership in advanced mobility. Niti Aayog has also come out with a [Model Concession Agreement \(MCA\)](#) document for introducing electric-bus fleet in cities for public transportation on Public-Private Partnership (PPP) mode. In order to boost private investment in Electric Vehicle (EV) charging infrastructure, Ministry of Power Ministry of Power (MoP) has issued the ["clarification on charging infrastructure for Electric Vehicles with reference to the provisions of the Electricity Act 2003"](#) on 13 April 2018.

In early 2018, the Ministry of Power launched the new [National Electric Mobility Programme](#) to focus on creating the charging infrastructure and a policy framework to set a target of more than 30% electric vehicles by 2030. Additionally, to address pollution from old vehicles, the government is working on an initiative that focuses on formulation of [end-of-life or scrappage policies](#) that proposes to take hundreds of thousands of polluting commercial vehicles off the road. It plans to give incentive for the adoption of these policies with the help of lower taxes, discounts on purchase prices, and simple compliance processes.

In India, CMVR-Technical Standing Committee (CMVR-TSC), Automotive Industry Standards Committee (AISC) and the Bureau of Indian Standards (BIS) formulate and recommend standards for the Automotive Industry. Ministry of Road Transport and Highway (MoRTH) and Ministry of Heavy Industry along with other ministries such as Ministry of Environment & Forest, Ministry of Petroleum & Natural Gas, Ministry of Power, Ministry of Non-Conventional Energy Sources are also involved in formulation of standards related to safety, emissions, noise, fuels, energy consumption and alternatively-fueled vehicles. BIS is also a founder member of International Organization for standardization (ISO). It represents India in the International Organization for Standardization (ISO), the International Electro-technical Commission (IEC) and World Standards Service Network (WSSN).

[World Forum for Harmonization of Vehicle Regulations \(WP.29\)](#) under the United Nations Economic Commission for Europe (UNECE) was formed with an aim to harmonize vehicle regulations worldwide. Three UN Agreements, adopted in 1958, 1997 and 1998, provide a legal and regulatory framework and provisions related to performance-oriented test requirements and procedures to contracting parties (member countries). India is not a contracting party to the 1958 agreement but signed the UN WP 29 1998 Agreement in February 2006. It continues to actively participate in the Global Technical Regulation (GTR) formulation by contributing data and subject matter expertise. India has currently more than 70% safety regulations which are either partially or fully technically aligned with GTRs and UN Regulations while keeping in view the Indian specific driving and environmental conditions.

2. Introduction

The Indian auto industry is recognised as a 'sunrise industry' as it has emerged as one of the fastest growing sector over last few years. India's annual production stood at 29.08 million vehicles (including passenger vehicles, commercial vehicles, three wheelers, and two wheelers) in FY18 as against 25.33 million in FY17, registering a healthy growth of 14.8% over the same period last year. As of April 2018, India has about 120 vehicles (all segments including 19 cars per 1000) on every 1000 people, which is expected to rise to almost 300 vehicles in next 10 years for every 1000 people. While the population (vehicle parc) of automobiles in India is expected to surge to 404 million by 2028 from 162.31 million in April, 2018. Currently, 24.37 million

automobiles are added every year and it is expected to rise to 55.84 million by 2028, still much lesser than the global average vehicle penetration. India is the 5th largest car manufacturer, 7th largest commercial vehicle manufacturer and largest manufacturer of two wheelers in the world. It is estimated that by 2020 the automobile industry in India will be the third largest in the World after China and USA.

India, being a prominent auto exporter, the exports stood at about 14% of the automobiles produced annually. After declining by about 4.5% in FY17, exports witnessed a sharp growth of over 16% in FY18. Two decades of robust growth have propelled India from being a net importer of automobiles to a leading manufacturer and exporter of vehicles and components.

The Two Wheelers segment leads the Indian Automobiles market with 80% market share owing to a growing middle class and a young population. This is followed by the Passenger Vehicle (PV) segment with 14% market share. India is also likely to benefit from low car penetration, emerging demographic dividend, increasing urbanization, rising incomes levels and consumption.

The top companies like Maruti Suzuki, Hyundai Motors, M&M, Tata Motors, Ashok Leyland, Hero MotoCorp, HMTI, TVS, Bajaj Auto and Piaggio etc. with their ever expensive dealing networks, promotional, convenient customer services have played a key role in the growth and development of the automobile industry in India.

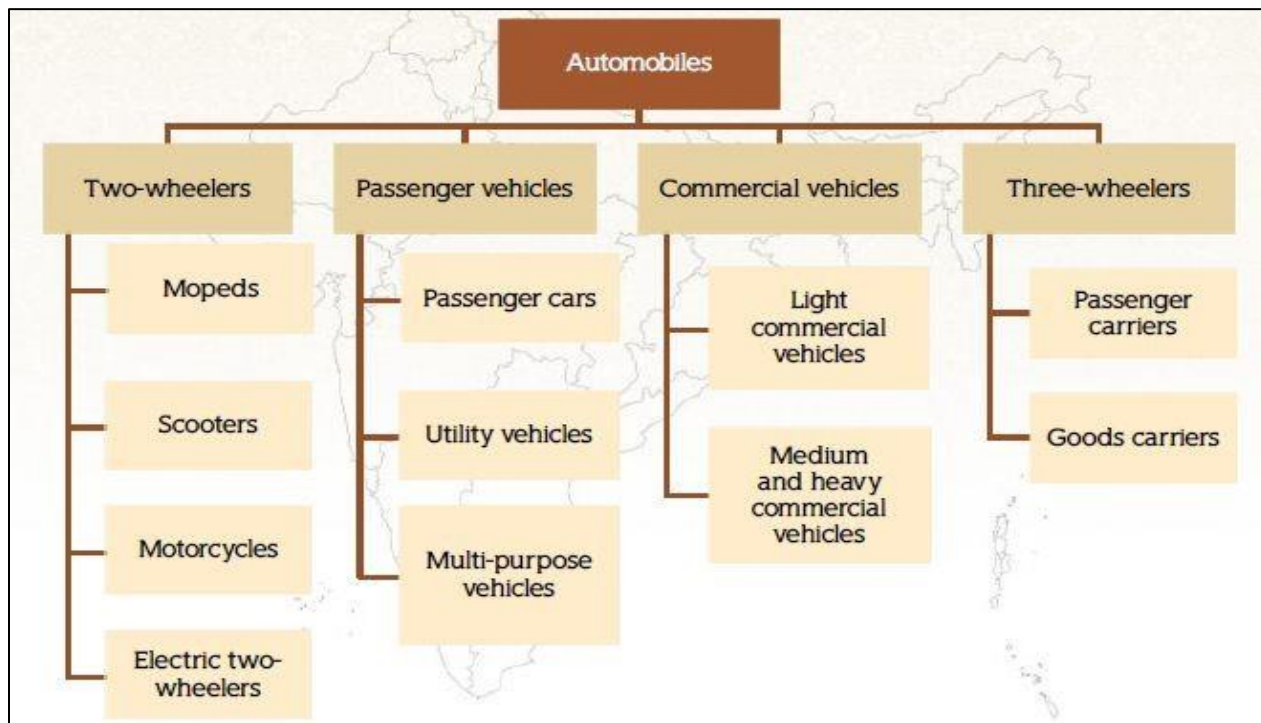
Transport industry in India is also main menace of pollution in several cities as it accounts for about 11% of India's carbon emissions. As many as 14 of the world's top 20 most-polluted cities are in India, according to a 2018 World Health Organization (WHO) [report](#). Keeping this in mind, Government of India has clearly demonstrated its intention to curb vehicular pollution through pivotal initiatives such as NEMMP, FAME scheme, and regulatory measures such as early introduction of Bharat Stage- VI in 2020. Also, fuel consumption standards (Bharat Stage IV in India, Euro VI standard worldwide) for Indian vehicles came into force in India in April 2017 for petrol, diesel, and liquefied petroleum gas (LPG) and compressed natural gas (CNG) passenger vehicles. These standards are based on a Corporate Average Fuel Efficiency (CAFE) system and targets to bring about around 18% improvement in fuel consumption of passenger vehicles by 2022, compared to 2012. According to a [new survey](#), about 87% of Indian drivers and vehicle owners would buy an electric vehicle (EV), if that helped reduce air pollution.

A number of Information and Communication Technology (ICT) in transport, which fall under the umbrella of Intelligent Transport System (ITS) are being used for improving connectivity and efficiency of urban and rural transport. In India, ITS is at its nascent stages. Most uses of ICT technologies that have so far been restricted application of Electronic Toll Collection (ETC) technologies on national and state highways, use of technologies for tracking, surveillance and information systems on public transport, and parking management systems in cities.

The outlook for the industry is very strong with India expected to become 3rd largest automobile manufacturing country after China and USA by 2030. Industry experts believe that India will overtake European automobile manufacturing countries by 2020 and USA by 2035. Nevertheless, the industry will also be facing challenges of increasing use of greener and cleaner technologies, fuel efficient vehicles, affordability and lack of good road infrastructure in the country.

Accordingly, it would be required to continuously invest in technological development to take care of the emerging environment issues like greener and cleaner technologies and emission levels while also developing new prototypes to meet customers' expectations in terms of affordability and comfort. As per the data published by Department of Industrial Policy and Promotion (DIPP), Government of India, Cumulative FDI inflow of around US\$ 16.7 billion in the sector between April 2000 – March 2017.

3. Current Profile of the Industry



3.1. Trends in Domestic Production

Trends in production of various types of vehicles are a better indicator of performance of the automobile industry. For the FY18, according to data released by the Society of Indian Automobile Manufacturers (SIAM), the industry produced a total 2,90,73,892 (29.07 million) vehicles, including passenger vehicles, commercial vehicles, three wheelers, two wheelers and quadricycle in FY18, against 2,53,29,383 (over 25 million) in FY17, registered a growth of 14.8%.

Automobile Production Trends

(Number of Vehicles)

Category	2013-14	2014-15	2015-16	2016-17	2017-18
Passenger Vehicles	30,87,973	32,21,419	34,65,045	38,01,670	40,10,373
Commercial Vehicles	6,99,035	6,98,298	7,86,692	8,10,253	8,94,551
Three Wheelers	8,30,108	9,49,019	9,34,104	7,83,721	10,21,911
Two Wheelers	1,68,83,049	1,84,89,311	1,88,30,227	1,99,33,739	23,14,70,57
Grand Total	2,15,00,165	2,33,58,047	2,40,16,068	2,53,29,383	2,90,73,892

Source: SIAM

The FY18 produced around 4,010,373 (4.01 million) units of passenger vehicles, which is 13.79% of the total vehicle produced in the country. Utility vehicles, too, crossed 1 million production milestone in FY18. One out of every three passenger vehicles produced was a utility vehicle. The auto sector witnessed highest-ever production in the passenger car and utility segment in the FY18. The industry produced 8,94,551 (0.89 million) units of Commercial Vehicles (CVs) in FY18 as against 8,10,253 (0.81 million) units in FY17.

Total three-wheeler production registered a strong growth of 30% to 10,21,911 (over 1 million) units in FY18 from 7,83,721 (0.78 million) units in FY16-17. Within three vehicles segment, passenger carriers up nearly 40%. In terms of the variants, passenger carriers commanded nearly 90% of total production at 8,99,023 (0.89 million) units, with goods carriers accounting for 1,22,888 (0.12 million) units.

The two-wheelers production surged by 16.12% to 23 million, despite the high base of 19.9 million units. Within two wheelers the production of scooters crossed 7 million and motorcycles crossed 15 million. India's emergence as an important production hub for automobiles has also resulted in increase in FDI flows to the sector.

3.2. Trends in Domestic Sales

India is currently one of the largest markets in the world as far as automobile sales are concerned. Car manufacturers raised a toast for the financial year 2017-18 as it turned out to be one of their best in terms of sales. The industry registered double-digit growth between 1st April 2017 and 31st March 2018. The year also marked India surpassing Germany as the fourth largest automobile market on a global scale to stand right behind China, the US, and Japan.

According to data released by the *Society of Indian Automobile Manufacturers (SIAM)*,

- **Passenger Vehicles:** the domestic sales of Passenger Vehicles (PVs) grew at 7.89 % to 32,87,965 (3.28 million) units in 2017-18, against 9.23 % in 2016-17.
 - Passenger Cars grew at 3.33 % to 2.17 million units,
 - Utility vehicles expanded at a strong 21% to 0.92 million units.
- **Commercial vehicle:** (CV) segment sales registered a strong growth of 20% in 2017-18, significantly higher than 4% in 2016-17.
 - medium and heavy vehicles grew 12.48% to 340,313 (0.34 mn) units,
 - light vehicles expanded at over 25% to 516,140 (0.52 mn) units.
- **Three-wheeler** sales also hit a new record of 635,698 (0.63 mn) units, growing at a whopping 24% growth rate from the previous year.
 - passenger carriers grew nearly by 29%,
 - goods carriers grew just under 8%.
- **Two-wheelers** also touched a new milestone of 20.19 million units last year, grew at 14.80%, compared with 7% in 2016-17.
 - Motorcycle sales grew 13.69% to 12.61 million units,
 - scooters expanded 20% to 6.71 million units.
 - Mopeds, declined over 3% to 0.85 million units.

Electric vehicle sales are still at a very nascent stage in India. As per [Society of Manufacturers of Electric Vehicles \(SMEV\)](#) data, EV sales stood at around 56,000 units in 2017-18 as against about 25,000 units in 2016-17. Despite the government's push for electric vehicles, barely 777 electric cars were sold in FY18, which comprise 0.023 % of overall PV sales.

Automobile Sales Trends

(Number of Vehicles)

Category	2013-14	2014-15	2015-16	2016-17	2017-18
Passenger Vehicles	25,03,509	26,01,236	27,89,208	30,47,582	32,87,965
Commercial Vehicles	6,32,851	6,14,948	6,85,704	7,14,082	8,56,453
Three Wheelers	4,80,085	5,32,626	5,38,208	5,11,879	6,35,698
Two Wheelers	1,48,06,778	1,59,75,561	1,64,55,851	1,75,89,738	2,01,92,672
Grand Total	1,84,23,223	1,97,24,371	2,04,68,971	2,18,62,128	2,49,72,788

Source: SIAM

Fiscal year 2017-18 was a milestone year for the Indian automotive industry. "Sales volume built upon last year's momentum to register double-digit growth for the first time since 2011-12, partly aided by improvement in the rural economy and partly due to the demonetisation-influenced low base in the second half of 2016-17.

3.3. Trends in Exports

According to data released by the **Society of Indian Automobile Manufacturers (SIAM)**, In April-March 2018, overall exports in automobiles increased by 16.12%.

Automobile Exports Trends

(Number of Vehicles)

Category	2013-14	2014-15	2015-16	2016-17	2017-18
Passenger Vehicles	5,96,142	6,21,341	6,53,053	7,58,727	7,47,287
Commercial Vehicles	77,050	86,939	1,03,124	1,08,271	96,867
Three Wheelers	3,53,392	4,07,600	4,04,441	2,71,894	3,81,002
Two Wheelers	20,84,000	24,57,466	24,82,876	23,40,277	28,15,016
Grand Total	31,10,584	35,73,346	36,43,494	34,79,169	40,40,172

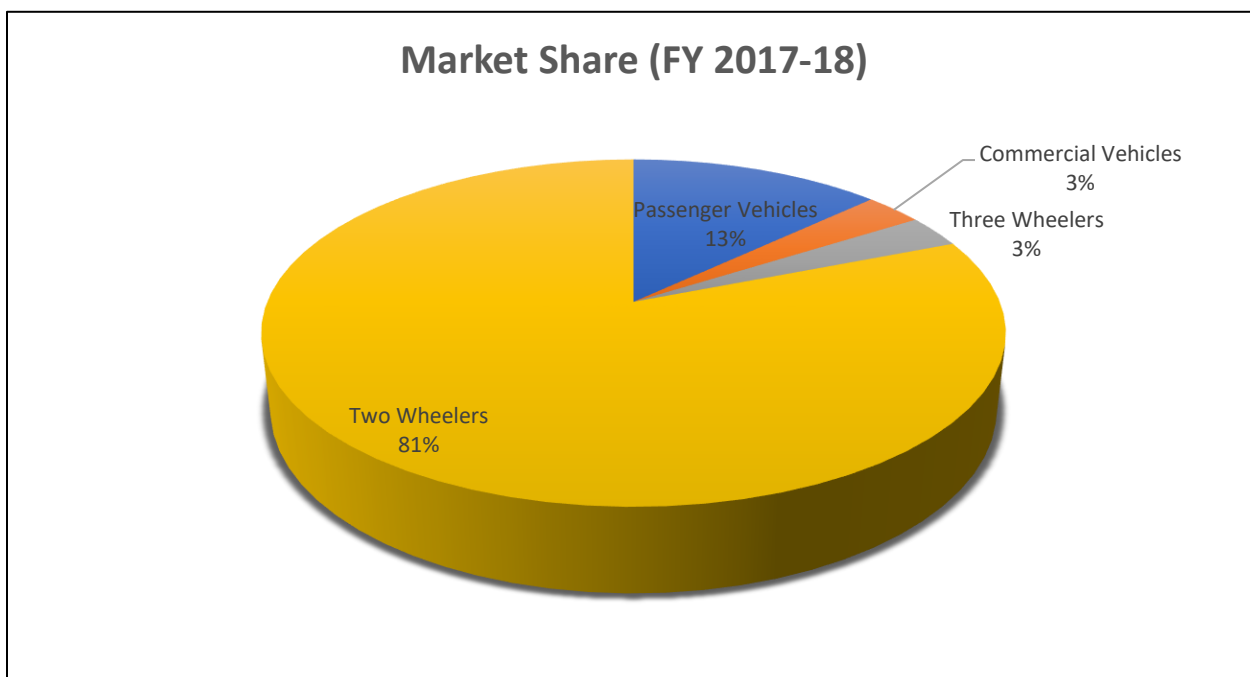
Source: SIAM

- The two-wheeler segment recorded highest-ever exports of 2.8 million, growing at 20.29%. Scooters and motorcycles individually touched exports peak at 314,000 (0.31 million) and 2.4 million, respectively.

- Three Wheeler exports jumped over 40% to 381,002 (0.38 million) units as against 271,894 (0.27 million) units. Of that, people carriers saw a growth rate of over 40% at 3,76,811 units, while goods carriers expanded nearly 45% to 4,191 units.
- Passenger Vehicles and Commercial Vehicles exports declined by (-) 1.51% and (-) 10.53% respectively in FY2018 over the same period last year.

3.4 Market segment

The Two Wheelers segment with 81 per cent market share is the leader of the Indian Automobile market owing to a growing middle class and a young population. Moreover, the growing interest of the companies in exploring the rural markets further aided the growth of the sector. This is followed by passenger vehicles having a share of 13%. Commercial vehicles and three-wheelers have about 3% share each in the automobile industry.



Domestic Market Share for 2017-18 (%)	
Passenger Vehicles	13
Commercial Vehicles	3
Three Wheelers	3
Two Wheelers	81
Grand Total	100

Source: SIAM

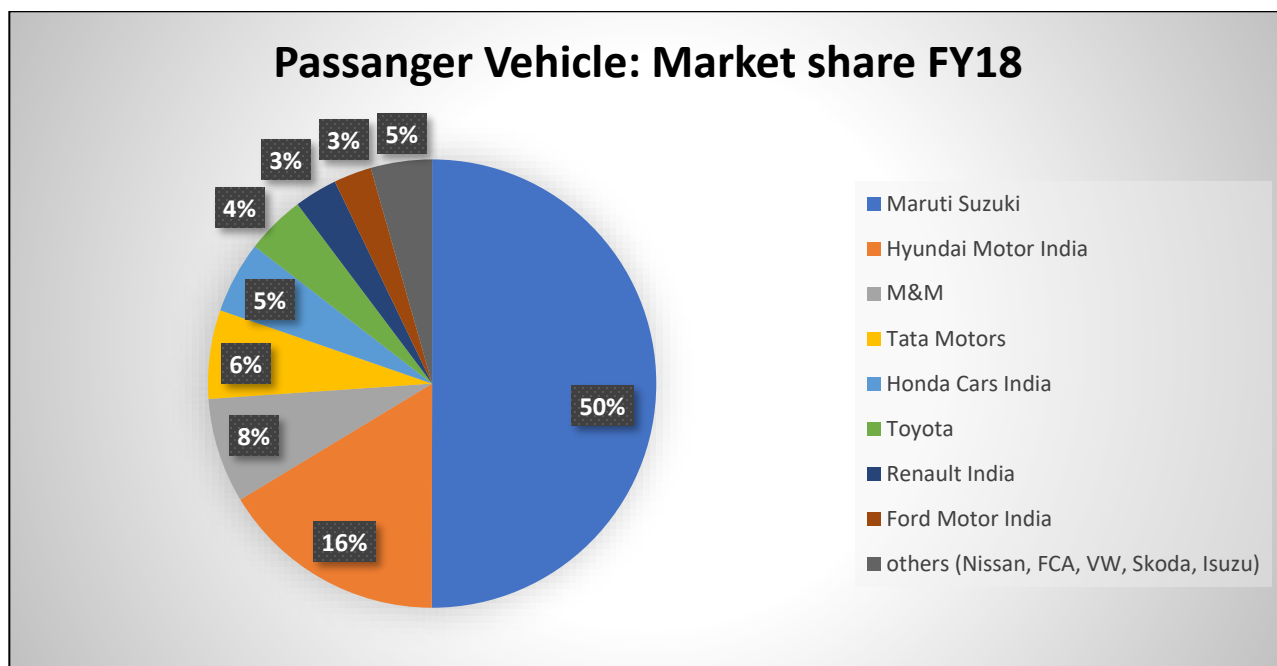
4. Market Players

Indian automobile industry is clearly dominated by 3 to 4 players in every vehicle category. Given below is the market share of automobile companies in India. The market share is mainly for top players in each segment based on vehicle sale for the period FY18.

Passenger Vehicles: Company wise Market Share:

Maruti Suzuki, Hyundai Motor India, Mahindra & Mahindra, Tata Motors and Honda Cars India stands in top 5 In terms of market share followed by Toyota, Renault, Ford, Nissan, General Motors, Volkswagen, Skoda, Fiat, etc.

Passenger vehicle Market Share FY18						
Company	Maruti Suzuki	Hyundai Motor	M&M	Tata Motors	Honda	Others
Market Share	49.98%	16.3%	7.56%	6.39%	5.17%	14.6%



Source: SIAM

Maruti Suzuki, India's largest carmaker as usual led the market with sales of over 1.64 million vehicles in FY18, an increase of 13.84% from its sales in FY17. The carmaker upped its market share very close to 50% from 47.38% in FY17 on the back of a strong product performance. The company has not only managed to sustain its huge sales but have also increased its market share in both urban and rural buyers. New car launches like Maruti Suzuki Dzire, all-new Swift along with the constant demand of Maruti Suzuki Baleno and Vitara Brezza helped the company to achieve this huge growth. The company also exported about 1.23 lakh units to its export markets.

Indian arm of the Korean car maker Hyundai Motor did post a growth of over 5 % by selling over 5.36 lakh cars and grabbing a market share of 16.30% in India. The launch of facelifts of Hyundai Grand i10 and Hyundai i20 along with all-new Verna backed by strong sales of Hyundai Creta has seen its manufacturing units in Chennai running full houses to cope up with the increasing demand. The company also exported over 1.53 lakh cars to various countries especially middle-east.

Mahindra & Mahindra (M&M) though growing 5.39% in terms of domestic sales to nearly 2.5 lakh units saw a slight slip in market share to 7.57% in FY18 from 7.75% an year earlier. **Tata Motors** however gained market share at 6.39% in FY18 from the earlier 5.66% in the previous fiscal. Its new product launches including the Tiago, Nexon, Hexa, Tigor and Nexon models have found the pulse of the consumers.

Japanese automaker Honda Cars India finished the year at industry growth rate and sold over 1.7 lakh units and the launch of its Honda WR-V SUV played a crucial role for the company to sustain sales.

After growing the volumes by 88% in FY17, **European company Renault India** has witnessed sales decline of 24.4 % to 1 lakh units in FY 18 in a market that grew 8%. The company will be banking on interventions on the Kwid and the petrol variant of Captur to infuse some excitement in its product portfolio to keep the volumes above 1 lakh in FY19.

Commercial Vehicles (CVs): Company wise market share:

Tata Motors, Mahindra & Mahindra, Ashok Leyland, VECVs – Eicher and Force Motors stands in top 5 in terms of market share based on sale of vehicle for the period FY18 followed by SML Isuzu, Maruti Suzuki India, VECVs – Volvo, Piaggio Vehicles and Isuzu Motors India.

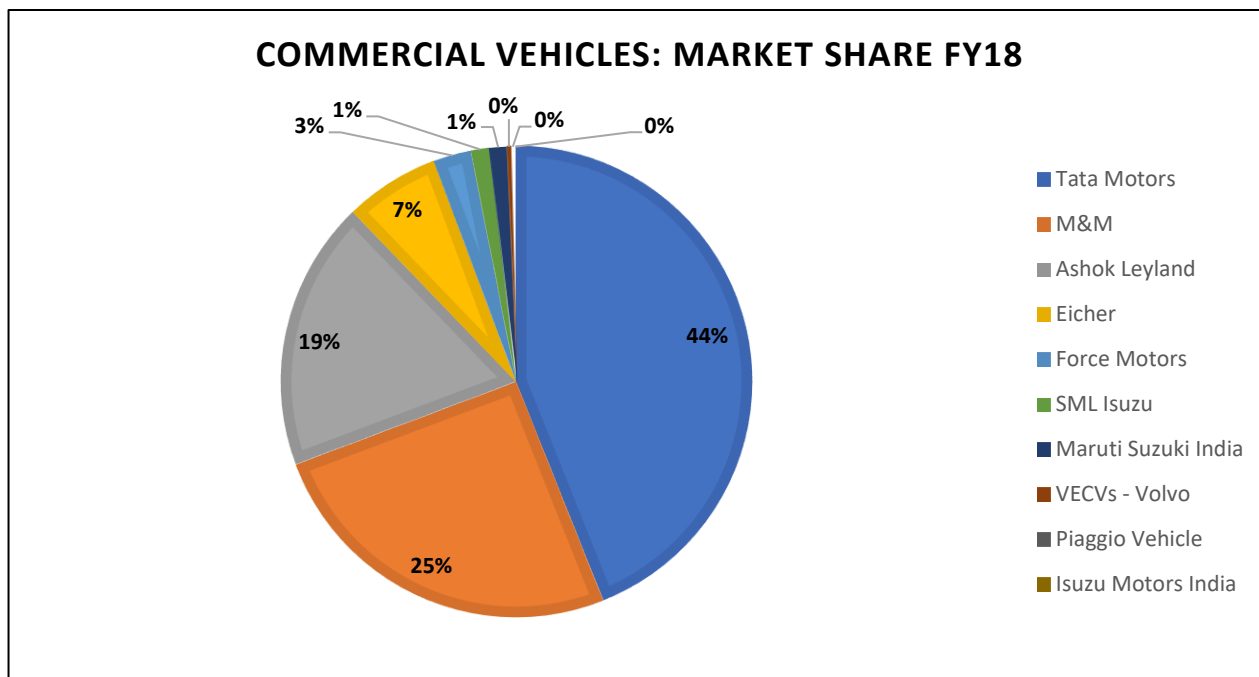
CVs Market Share FY18						
Company	Tata Motors	M&M	Ashok Leyland	Eicher	Force Motors	Others
Market Share	43.96%	25.31%	18.52%	6.52%	2.59%	3.10%

Homegrown Tata Motors continued to show an upswing in all vehicle segments including CVs with a growth of 23.18% to 376,456 units. It upped its market share 43.96% from 42.79% in FY17. The company has been actively restructuring its automotive businesses and the results are beginning to show.

Mahindra & Mahindra retained its second slot with sales of 216,800 units and a growth of 19.81%. But its market share slipped marginally to 25.31% from 25.33% in FY17.

At third slot was **Ashok Leyland** with a decline in market share from 18.66% in FY17 to 18.52% in FY18. However it clocked sales of 158,612 units with a step up of 19.02 percent.

VE Commercial Vehicles, the JV between Volvo Group and Eicher Motors, recorded sales 56,927 units (including 55,872 units of Eicher & 1,055 units of Volvo) in FY 18 as compared to 50,569 units in FY 2017, recording a growth of 12.5% per cent while **Piaggio Vehicles** sales declined by 31.4% to 2174 units in FY 18 from 3191 units in FY 17.



Source: SIAM

Three Wheelers: Company wise Market Share

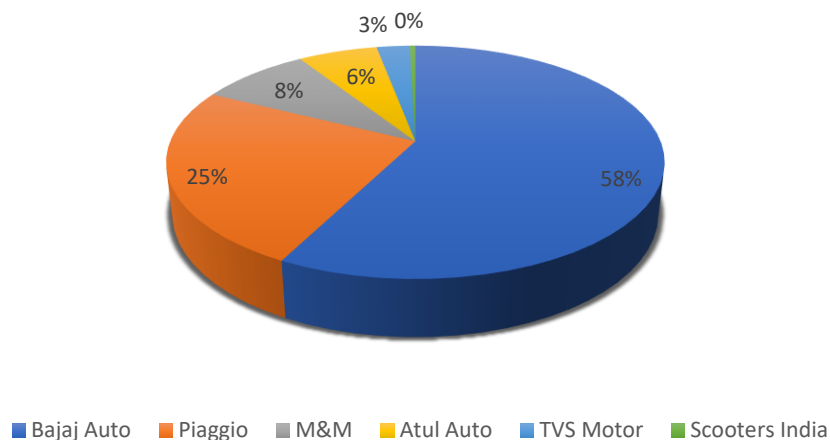
Bajaj Auto, Piaggio Vehicles, M&M, Atul Auto and TVS Motor stands in top 5. Bajaj **Auto**, three-wheeler market leader sold a total of 369,637 units, an increase of 8.7 percent, which includes 346,846 passenger carriers (+7.36%) and 22,791 goods carriers (+7.27%). The smart uptick helped the company further increase its market share from 49.45 percent in FY2017 to 58.15 percent in FY2018.

Three Wheelers Market Share FY18						
Company	Bajaj Auto	Piaggio	M&M	Atul Auto	TVS Motor	Scooters India
Market Share	58.15%	24.05%	8.59%	6.19%	2.58%	0.44%

The second largest player in the segment, **Piaggio Vehicles** sold 152,879 units, a marginal increase of 1.16 percent. Interestingly despite the marginal YoY growth, its market share came down to 24.05 percent in FY2018 from the existing 29.52 percent.

M&M continued to lose out on market share in the three-wheeler segment. It slipped to 8.59 percent share in FY18 from 10.22 percent in FY17. It however increased its sales volumes by 4.43 percent to 54625 units.

Atul Auto registered a growth of 7.74% in FY18, sold 39,333 units. In spite of its YOY growth, its market share slipped to 6.19% in FY18 from 7.14% previous year.

Three Wheelers: Market Share FY18

Source: SIAM

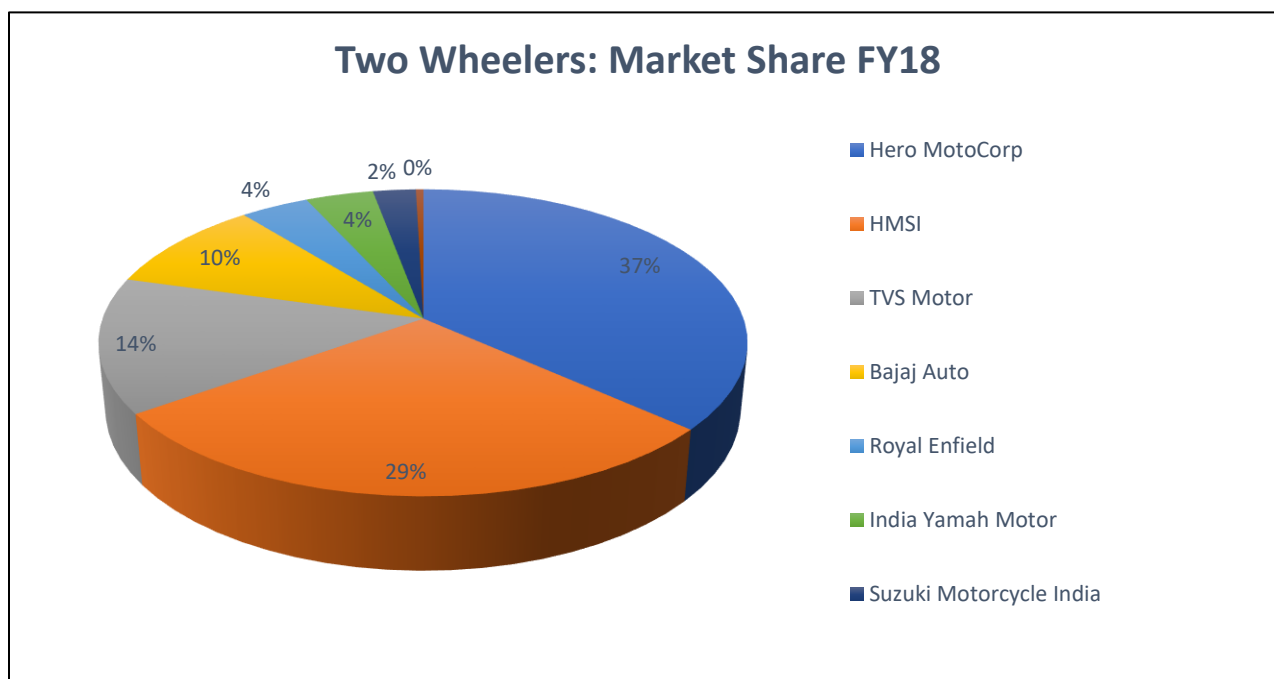
TVS Motor Company meanwhile bettered its market share to 2.58 percent from 2.40 percent in FY17. It also witnessed a strong growth of 33.81 percent to 16429 units in FY18.

Two wheelers: Company wise Market Share

As per SIAM report, India has 11 motorcycle manufacturers and 7 scooter manufacturers. Motorcycles contributed to 62.4 percent of the total sales, scooters increased their contribution to 33.27 percent and mopeds share declined to 4.25 percent. Hero MotoCorp, Honda Motorcycles and Scooters India (HMSI), TVS Motor, Bajaj and Royal Enfield stands in top 5 followed by Suzuki Motorcycle and Yamaha Motor India etc.

Two Wheelers Market Share FY18							
Company	Hero Motorcorp	HMSI	TVS	Bajaj Auto	Royal Enfield	Yamaha Motor	Others
Market Share	36.56%	28.60%	14.24%	9.78%	3.97%	3.93%	2.92%

Hero MotoCorp, the world's largest two-wheeler manufacturer has continued to be the leader in the Indian two-wheeler industry by selling over 73.82 lakh motorcycles with a growth of about 14 percent in FY18. Despite YOY growth it lost slight market share from 36.86 percent in FY17 to 36.56 percent in FY18. Hero Splendor has been India's top-selling motorcycle and launch of new products like Hero Glamour and HF-Deluxe continue to allure buyers especially in the rural markets. Hero MotoCorp did lose out on its scooter sales to its former Japanese partner Honda Motorcycles and Chennai based TVS Motor Company also overtook Hero in scooter sales. Hero also exported over 2 lakh motorcycles in India.



Source: SIAM

Honda Motorcycles and Scooters India (HMSI) has registered a massive growth of 22.23 percent in 2017-18 and sold a total of over 57.75 lakh motorcycles. Scooters contributed to over 66 percent of Honda's total two-wheeler sales in India with over 38.21 lakh scooters sold. Honda Active is the country's most sold scooter and the company has also launched the Honda Grazia and Honda Cliq to cater to the younger audience. HMSI's market share stands at 28.60 percent.

TVS Motor Company often referred in the industry as one of the most sorted companies in India has grown by over 15% last financial year and its new sports bikes in Apache series and also commuters like TVS Victor along with major boost from TVS Jupiter has helped the company to achieve a total sales of over 28.75 lakh, grabbing a market share of 14.24 percent.

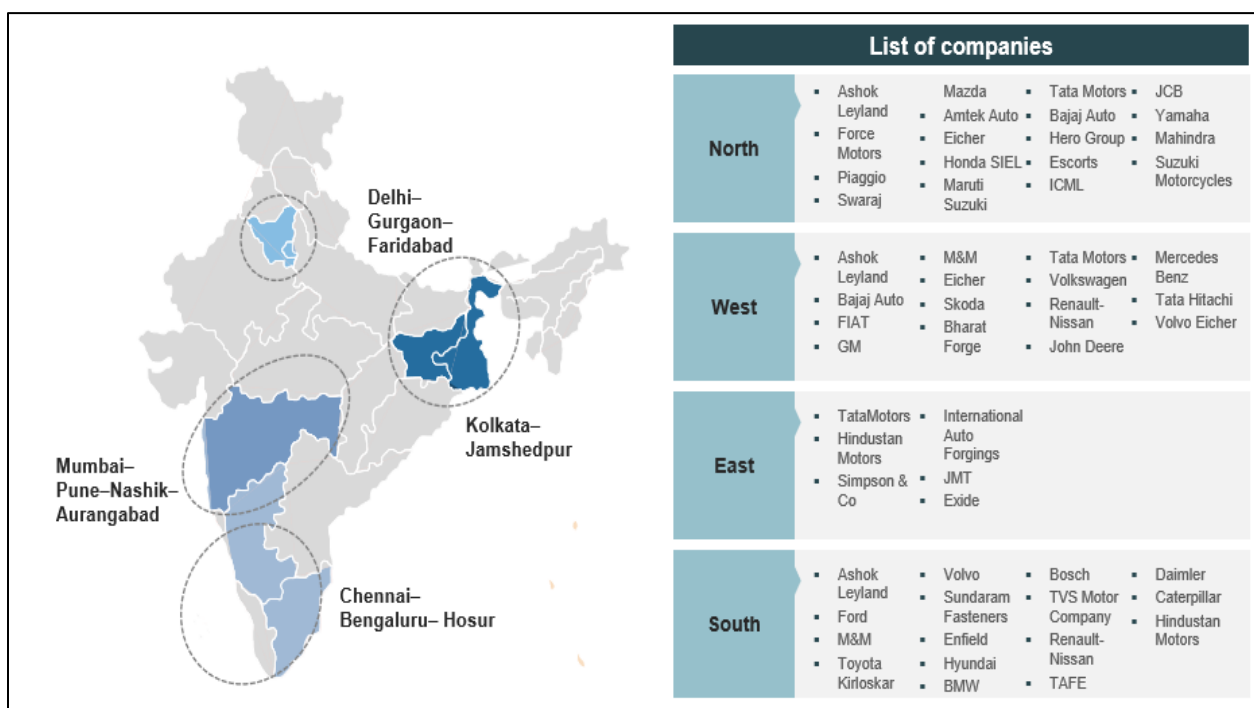
Only motorcycle manufacturers **Bajaj and Royal Enfield** have reported a sales of 19.74 lakh units and 8.01 lakh units respectively. While Bajaj Auto's sales did drop by 1.3 percent YoY, Royal Enfield grew by over 23 percent and recorded its most sales ever. Royal Enfield Interceptor 650 and Royal Enfield Continental GT 650 that were showcased at EICMA 2017.

Japanese two-wheeler manufacturers, **Suzuki Motorcycle and Yamaha Motor** India sold a total of 5.01 lakh and 7.92 lakh units respectively. Both of these companies sell scooters, commuters and premium motorcycles in India. Suzuki Motorcycle closed the financial year at a market share of 2.48 percent and Yamaha's market share in India is 3.92 percent.

5. Demographic Distribution

The majority of India's car manufacturing industry is based around four clusters-

- I. Delhi-Gurgaon-Faridabad-Ghaziabad-Gautama Buddha Nagar in (North),
- II. Mumbai-Pune-Nasik-Aurangabad-Thane in (West) and
- III. Chennai - Bangalore-Dharampuri-Vellore-Kanchipuram-Thiruvallore in (South)
- IV. Kolkata-Jamshedpur in (East).



Source: ACMA, Aranca Research

The southern cluster consisting of Chennai is the biggest with 35% of the revenue share. The western hub near Mumbai and Pune contributes to 33% of the market and the northern cluster around the National Capital Region contributes 32%. Chennai, houses the India operations of Ashok Leyland, Ford, Hyundai, Renault Nissan, BMW, Hindustan Motors and Daimler. Chennai also accounts for 60% of the country's automotive sector.

Gurgaon and Manesar in Haryana form the northern cluster where the country's largest car manufacturer, Maruti Suzuki, is based. The Chakan corridor near Pune, Maharashtra is the western cluster with companies like General Motors, Volkswagen, Skoda, Mahindra and Mahindra, Tata Motors, Mercedes Benz, Land Rover, Jaguar Cars, Fiat and Force Motors having assembly plants in the area.

As part of western cluster Nashik, Maharashtra has a major base of Mahindra and Mahindra with a SUV assembly unit and engine assembly unit. Aurangabad with Audi, Skoda and Volkswagen also forms part of the western cluster. Another emerging cluster is in the state of Gujarat with manufacturing facility of

General Motors in Halol and further planned for Tata Nano at their plant in Sanand, Ford, Maruti Suzuki and Peugeot –Citroen plants are also set to come up in Gujarat. Kolkata with Hindustan Motors, Noida with Honda and Bangalore with Toyota are some of the other automotive manufacturing regions around the country.

“With the emergence of 4 large automotive clusters in the country i.e. the Delhi-Gurgaon-Faridabad in the north, Sanand-Halol and Mumbai-Pune-Nasik-Aurangabad in the west, Chennai-Bengaluru-Hosur in the south and Jamshedpur-Kolkata in the east, India is fast on its way to becoming the primary global automobile manufacturer. The government of India is more than willing to lead this charge and assist this sector in every way to help it achieve its full potential”.

6. Status of E-Mobility

Government of India has set its ambitious target of having 100% electric vehicle fleet by 2030 on road and has been taking various steps to promote and to encourage the adoption of EVs throughout the country. Despite the continued push by the Centre and various states for adoption of electric mobility, presently, pure electric vehicle penetration in India is barely 0.1 % in private vehicles, about 0.2 % in two-wheelers and nearly zero for commercial vehicles.

It is not to say that it will be a smooth ride. There are various issues that India has to work upon, in order to successfully meet its goal of having 100% electric vehicle fleet on road by 2030. These include the following:

- **Lack of adequate charging Infrastructure:** The lack of proper electric vehicle charging infrastructure poses one of the greatest obstacles for 100% adoption of electric vehicles on road by 2030 in the country. Currently, there are over 200 public charging points in India, which stands as a huge outlier in comparison to china, Japan and the USA that have over 30,000 to 50,000 charging points.
- **Shortage of Battery Raw Material:** India falls extremely behind in the lithium and cobalt reserves. It needs to speed up in securing lithium and cobalt. Cobalt’s reserve is extremely low, limited only in Nagaland, Jharkhand and Orissa.
- **Long charging time:** Just like conventional vehicles rely on petrol pumps or gas stations for refuelling, the mass adoption of electric vehicles mandates a robust charging infrastructure. the charging process of EVs can take anywhere from 30 minutes (in case of fast charging) up to 24 hours, depending on the capacity of the battery and motors. Most, however, take around four to six hours to be fully charged, which is several times longer than the time it takes to refuel a petrol/diesel car.

- **Lack of Consumer awareness and price sensitivity:** One of the key challenges faced by the EV globally is the lack of consumer awareness about EVs. Traditionally, the Indian consumer is extremely price sensitive and would be hesitant to invest in environmentally friendly products that are too expensive. Unless the battery and other electro-mobility parts are economically at par with the established ICE engine market, it is difficult for EVs to make a dent in the Indian market. EVs are expensive primarily due to their costly batteries which are mostly imported. The government also plans to set up a lithium-ion battery-making facility under Bharat Heavy Electricals. In parallel, gradual improvements in the other technologies including motors would bring a decline in the overall costs of EVs and help set the base for market establishment.

After the government said it wanted only electric vehicles to ply on Indian roads by 2030, top companies have announced plans to enter the electric vehicles market as emphasised below:

- JustRide, a self-drive car rental firm, has raised US\$ 3 million in a bridge round of funding led by a group of global investors and a trio of Y Combinator partners, which will be utilised to amplify JustRide's car sharing platform JustConnect and Yabber, an internet of things (IoT) device for cars that is based on the company's smart vehicle technology (SVT).
- Ford Motor Co. plans to invest Rs 1,300 crore (US\$ 195 million) to build a global technology and business centre in Chennai, which will be designed as a hub for product development, mobility solutions and business services for India and other markets.
- [Ola announced 'Mission: Electric' to bring one million EVs on to India's roads by 2021, starting with starting with 10,000 electric rickshaws in the next 2 years](#)
- [Maruti Suzuki Flags Off Electric Vehicles For Field Testing In India](#)
- [BESCOM launches second electric vehicle charging infra in Bengaluru](#)
- [MG Motor India, the Indian arm of SAIC, is planning to launch a pure electric vehicle in the first quarter of 2020, the second product from MG Motor in India.](#)
- [Japanese car major Honda plans to pump in over Rs 9,200 crore \(over 1 euro billion\), its largest investment for India, to set up a third factory to launch hybrid and electric vehicles, and drive in new models and upgrades.](#)
- [Japan's Suzuki Motor Corporation has joined hands with Toshiba Corporation and Denso to set up a plant in India to produce lithium ion batteries, entailing an investment of nearly Rs 1,200 crore \(nearly 145 euro million\).](#)
- [Suzuki Motor Corporation the parent company of Maruti Suzuki — Denso along with Toshiba would jointly invest USD 180 million \(Rs 1,135 crore\) for setting up a battery pack manufacturing plant in Gujarat that will start production in 2020.](#)
- [Honda cars plans to roll out electric vehicles in India by 2023-24](#)

7. Status of Intelligent Transport System (ITS)

Intelligent Transport Systems (ITS) add information and communications technology (ICT) to transport infrastructures and vehicles in an effort to improve their safety, reliability, efficiency and quality. In India, ITS is at its nascent stages. Most uses of ICT technologies that have so far been restricted application of Electronic Toll Collection (ETC) technologies on national and state highways, use of technologies for tracking, surveillance and information systems on public transport, and parking management systems in cities. Systems like electronic ticketing and automated fare collection systems have been mostly limited to metro systems.

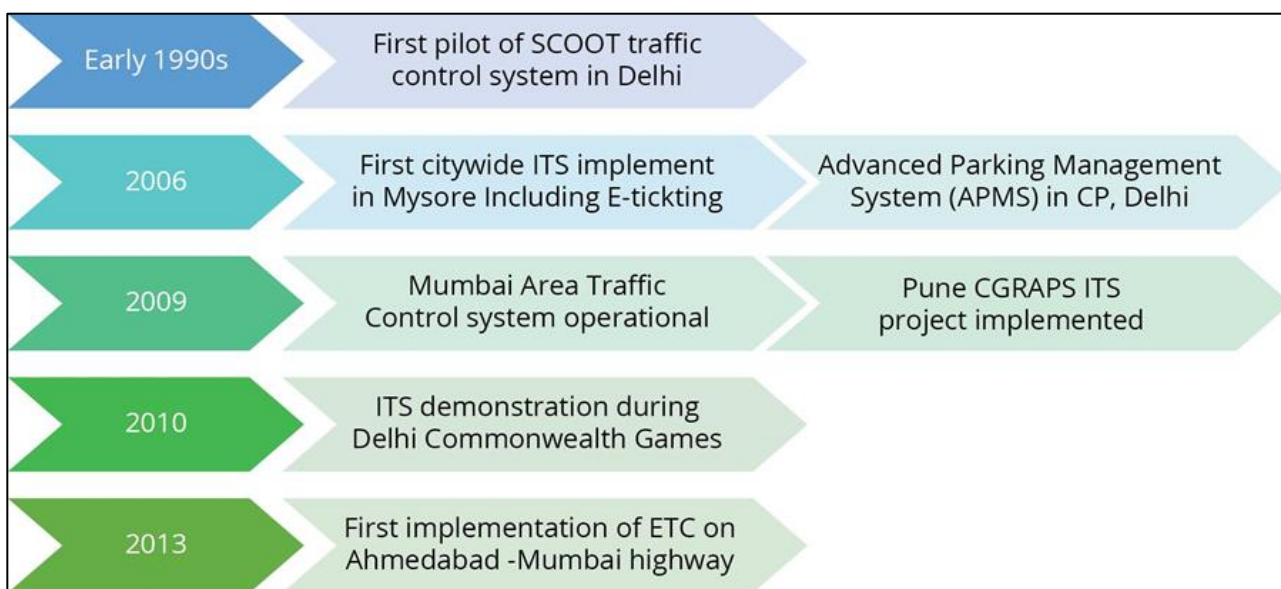


Fig: ITS milestones in India

Some of the major issues in successful implementation of this technology in India, as listed below:

- **Replication Issues:** ITS technologies have the ability of managing traffic flows by making commuters more informed about congestion and safety issues. However, these technologies around ITS in India, cannot be a mere replication of technologies from the developed nations. The technologies will need to be adapted to the complex situation in India, including disorderly traffic with high heterogeneity of vehicles and rapidly evolving economy, after significant research.
- **Contractual and procurement issues:** ITS being a nascent area in India, contractual and procurement issues have often come up in the recent past, resulting in several reissuing of tenders. These have included particular conditions of contract, financial security, flouting of standard procurement norms and problems in concessionaire terms and conditions for Public-Private-Partnership (PPP) designed projects. Also competing tenders at state- or city-level often lead to uncoordinated adoptions of incompatible technologies, generating fragmentation that hampers nationwide and interoperable developments.

- **Technical issues:** For similar reasons of unfamiliarity and unpreparedness, technical issues have also haunted ITS implementations. These range from interoperability issues between various components to improper operations and maintenance of ITS equipment due to lack of proper skilled support staff, resulting in technologies lying waste after implementation.
- **Coordination and planning:** Successful ITS technology implementations almost always have the prerequisite of a robust civil infrastructure. There have been several instances of ITS implementations for public transport that have met an untimely end because they had to be torn down for other planned infrastructure work. This happens mostly due to ill planned work and lack of coordination, planning and dissemination among various agencies.
- **High Cost:** High cost for ITS safety systems does not allow high penetration. Few people are willing to pay extra for safety systems and only few technologies are sufficient to ensure safety.

8. Growth drivers

There are several key drivers that have affected the automobile industry in India. These include:

- I. **Government regulations:** The automobile industry in India has received extensive government support and this has encouraged a lot of foreign direct investment in the industry. The government permits 100% foreign direct investment in this industry and it is fully delicensed making it easy for investors to penetrate it and set up shop in India. Additionally, there are also tax incentives and investors can actually export the automobiles for free.
- II. **Low car penetration & Rising family income:** India has about 120 vehicles (all segments including 19 cars per 1000) on every 1000 people right now, which is expected to rise to almost 300 in next 10 years. Around 60% of the mobility demand in India is served by public transportation modes like buses and metros and non-motorized transport modes (walking and cycling). India's per capita income grew at pace of 8.6 per to Rs. 1,12,835 (1375 Euro) during FY18 from Rs. 1,03,870 (1265 Euro) in FY17. The growing domestic income is to make motor vehicles more affordable for local consumers.
- III. **Young population:** Indian is one of the youngest country in the world with more than 50% of population is below the age of 25 years and more than 65% is below the age of 35%. A young population may lead to higher personal vehicle ownership.
- IV. **Greater Availability of cheaper and easier finance:** All nationalized and scheduled banks offers loans for purchase of new vehicles at very low interest rates. In India nearly 70-75% of the new vehicle purchases are done by using bank loans. This indicates that Indian auto industry is unique in the way vehicles are purchased by consumers.
- V. **Research and Development:** There have been many research and development initiatives, both private and governmental. These are aimed at improving the automobile industry in India. The government started the Automotive Component Manufacturers Association of India (ACMA) which is an apex body that deals with

the automobile industry in India. This body looks into matters such as upgrading of technology in the industry, collecting information on industrial events and trends as well as disseminating this information to relevant stakeholders. The body does this through research and also promotes trade in both domestic and foreign circles. On their part, private investors have also set up research and development initiatives within their companies. For instance the Mahindra and Mahindra research centre for electric vehicles in order to enhance their services in India.

- VI. **Stable economy:** Many experts predict that the future of the automobile industry in India is bright. However this is subject to the economic stability of the country and currency inflation rates. Economic stability and low inflation will increase incomes for majority of Indians and raise the domestic consumption of automobiles in the country.

9. Government Policy Initiatives

Some of the major initiatives taken by the Government of India are:

9.1. National Auto Policy 2018 (Draft)

In February 2018, The Department of Heavy Industry (DHI), Ministry of Heavy Industries & Public Enterprises (MoHI&PE) released the draft National Auto Policy (NAP).

Vision: “To provide a long-term, stable and consistent policy regime and to have a clear roadmap for the automotive industry, making India a globally competitive auto R&D and manufacturing hub and achieving the targeted objectives of green mobility”

Mission: The National Auto Policy is envisaged to achieve the following missions:

- To propel India as an automotive industry amongst the top 3 nations in the world in engineering, manufacturing and export of automotive vehicles and components.
- To scale-up exports to 35-40% of the overall output and become one of the major automotive export hubs in the world.
- To enable the automotive sector to become one of the largest employment creation engines.
- To enable the automotive sector in India to become a global hub for research & development.
- To drive the automotive sector in India to adopt safe, clean and sustainable technologies.

Objectives: The objectives of the National Auto Policy are:

- Increase contribution to GDP To support the growth of the automotive industry in India and become one of the major contributors to the country's GDP and comprise a considerable proportion of the manufacturing sector GDP by 2026
- Increase exports To scale-up exports to 30-40% of the overall output over the next decade and improve the brand recognition, competitiveness and technological advancement of the Indian automotive industry across the world

- Drive employment generation and skill development To become a solid foundation for job creation in the automotive sector, both direct and indirect, over the next decade and become a major driver of the 'Skill India' program
- Increase local R&D investments to drive the R&D efforts in the automotive sector towards indigenous research, design and engineering in both automotive vehicles and components
- To promote clean, safe, efficient and comfortable mobility for every person in the country, with a focus on environmental protection and affordability

For more information please click [here](https://dhi.nic.in/writereaddata/UploadFile/DHI-NAB-Auto%20Policy%20Draft%20Document_vDRAFT.pdf) (https://dhi.nic.in/writereaddata/UploadFile/DHI-NAB-Auto%20Policy%20Draft%20Document_vDRAFT.pdf)

9.2. 100% FDI & Delicensing

The Government of India encourages foreign investment in the automobile sector and allows 100 per cent Foreign Direct Investment (FDI) under the automatic route and fully delicensing making it easy for investors to set up their manufacturing plant/shop in India.

9.3. Automotive Mission Plan 2016-26

The [Automotive Mission Plan 2016-26 \(AMP 2026\)](#) is the collective vision of Government of India (Government) and the Indian Automotive Industry on where the Vehicles, Auto-components, and Tractor industries should reach over the next ten years in terms of size, contribution to India's development, global footprint, technological maturity, competitiveness, and institutional structure and capabilities. AMP 2026 also seeks to define the trajectory of evolution of the automotive ecosystem in India including the glide path of specific regulations and policies that govern research, design, technology, testing, manufacturing, import/ export, sale, use, repair, and recycling of automotive vehicles, components and services. AMP 2026 is a document that is aimed at multiple stakeholders in India and overseas, and seeks to communicate the Government and industry's intent and objectives pertaining to the Indian Automotive industry, comprising the automotive vehicle manufacturers, the auto-component manufacturers and tractor manufacturers who operate in India.

Some of the key highlights of the [Automotive Mission Plan 2026](#) are

- Indian automotive industry to grow 3.5 to 4 times of the current value of USD 74 billion to USD 260 billion to 300 billion.
- By 2026, passenger vehicles likely to increase between 9.4 - 13.4 million units, commercial vehicle between 2.0 - 3.9 million units, two wheeler to grow to 50.6 - 55.5 million, and tractors to 1.5 - 1.7 million units.
- India to be among the top three automotive industries in the world.
- Contribute over 12 percent to India's GDP.
- Generate 65 million more jobs.
- AMP aims to make Indian automotive industry to be the engine of 'Make in India' initiative.
- The industry will look to increase exports multifold to reach 35-40 percent of overall output.

- AMP envisages to implement End of Life Policy for automotive vehicles and components.
- BSV norms to be adopted by 2019 and BSVI norms to be implemented 2023 for passenger vehicle.
- Auto Component to grow to Rs 593,500 crore (7.13B Euro) - Rs 732,000 crore (97.6B Euro).

The growth of Indian middle class with increasing purchasing power along with strong growth of economy over last one decade has attracted major auto makers to Indian market. High potential domestic demand, availability of raw materials and skilled manpower at competitive costs on one hand and near stagnation in auto sector in USA, EU and Japan on the other hand have worked as a push factor for shifting of new capacities and flow of capital to the Indian automotive industry. The increasing competition among automobile companies has not only resulted in multiple choices for consumers at competitive cost but has also ensured improvement in productivity by almost 20% a year in the first half of the previous decade which is highest in Indian manufacturing sector. [Read more/Download](#)

9.4. National Automotive Testing and R&D Infrastructure Project (NATRiP)

The National Automotive Testing and R & D Infrastructure Project (NATRiP) is an initiative of the Government of India in the automotive sector. The aim of this Project is to improve the core competencies in Automotive sector in India and facilitate seamless integration of Indian Automotive industry with the world as also to position the country prominently on the global automotive map.

The vision of this project involves:

- Deepen manufacturing
- Encourage localized R&D
- Boost exports and
- Converge India's unparalleled strengths in IT and electronics with automotive engineering sectors, to firmly place India in USD six trillion global automotive business. The project has set the above vision keeping in mind certain facts,
- Tractor sales in the country are expected to grow at CAGR of 8-9% in the next five years, upping India's market potential for international brands. Two-wheeler production has grown from 8.5 Million units annually to 15.9 Million units in the last seven years. Significant opportunities exist in rural markets. India's car market has the potential to grow to six Million-plus units annually by 2020
- India is currently the seventh largest producer in the world with an average annual production of 23.36 Million vehicles, of which 3.57 Million are exported.
- The Indian automobile market is estimated to become the third largest in the world by 2016 and will account for more than 5% of global vehicle sales.
- India is the second largest two-wheeler manufacturer, the largest motorcycle manufacturer and the fifth largest commercial vehicle manufacturer in the world.

The NATRIP initiative will help the industry in undertaking technology development at comparatively much lesser costs for the auto manufacturers when weighed against with the global automotive development

costs. These facilities are setup by the government of India with a vision to provide the essential impetus to Indian auto industry which will help drive it to a position where it will cater not only to the ever-challenging and increasing indigenous demands but also it will be looked upon by the world to provide solutions for globally present challenges in the Auto Industry.

Ministry of Heavy Industries & Public Enterprises, Government of India, has constituted NATRIP Implementation Society (NATIS), an autonomous body, for the execution of National Automotive Testing and R&D Infrastructure Project (NATRIP). NATIS has been entrusted to set up state of the art, Automotive Test facilities at six locations across India, with an investment of Rs 3727.30 Cr. (Approx. 455 euro million). The project involves collaboration among the Government of India, a number of State Governments and Indian Automotive Industry to create a state-of-the-art Testing, Validation and R&D infrastructure in the country.

As part of NATRIP, the following test centers have been finalized to setup the test facilities as described below:

- [International Center for Automotive Technology \(iCAT\): Manesar, Harayana](#)
- [Global Automotive Research Center \(GARC\): Chennai](#)
- [National Automotive Test Tracks \(NATRAX\) : Indore, Madhya Pradesh](#)
- [Automotive Research Association of India \(ARAI\) : Pune, Maharastra](#)
- [Vehicle Research and Development Center \(VRDE\) : Ahmednagar, Maharastra](#)
- [National Institute for Automotive Inspection, Maintenance & Training \(NIAIMT\) : Silchar, Assam](#)
- [The National Center For Vehicle Research & Safety \(NCVRS\) Rae-Bareli](#)

For more information please [click here](#)

9.5. National Electric Mobility Mission Plan 2020(NEMMP)

Government of India (GoI) launched the [National Electric Mobility Mission Plan \(NEMMP\) 2020](#) in 2013. The National Electric Mobility Mission Plan 2020 is one of the most important and ambitious initiatives undertaken by the GoI that has the potential to bring about a transformational paradigm shift in the automotive and transportation industry in the country.

Some of the key objectives of the National Electric Mobility Mission Plan 2020 are:

- To encourage reliable, affordable and efficient xEVs (hybrid and electric vehicles) that meet consumer performance and price expectations through government-industry collaboration.
- Promotion and development of indigenous manufacturing capabilities, required infrastructure, consumer awareness and technology are additional objectives of NEMMP 2020.
- India to emerge as a leader in the two-wheeler and four-wheeler xEV market in the world by 2020, with total xEV sales of 6-7 million units thus enabling the Indian automotive industry to achieve global xEV manufacturing leadership and contributing towards national fuel security.
- Target of putting 6 million electric & hybrid vehicles per year on road by 2020 under NEMMP 2020.

It is a composite scheme using different policy-levers such as:

1. Demand side incentives to facilitate acquisition of hybrid/electric vehicles.
2. Promoting R&D in technology including battery technology, power electronics, motors, systems integration, battery management system, testing infrastructure, and ensuring industry participation in the same.
3. Promoting charging infrastructure
4. Supply side incentives
5. Encouraging retro-fitment of on-road vehicles with hybrid kit

9.6. Faster Adoption and Manufacturing of (Hybrid &) Electric Vehicles in India (FAME)

Faster Adoption and Manufacturing of (Hybrid &) Electric Vehicles scheme was launched in 2015 under National Electric Mobility Mission Plan (NEMMP) with the objective to support hybrid/electric vehicles market development and Manufacturing eco-system. The overall scheme is proposed to be implemented over a period of 6 years, till 2020. The scheme has 4 focus areas i.e.

- I. Technology development
- II. Demand Creation,
- III. Pilot Projects and
- IV. Charging Infrastructure.

The FAME India Scheme is aimed at incentivizing all vehicle segments i.e. 2 Wheeler, 3 Wheeler Auto, Passenger 4 Wheeler Vehicle, Light Commercial Vehicles and Buses. The scheme covers Hybrid & Electric technologies like Mild Hybrid, Strong Hybrid, Plug in Hybrid & Battery Electric Vehicles.

FAME is designed to implement in a phased manner. Phase I of the FAME-India Scheme was initially proposed for two years viz. FY15-16 and FY16-17 but was extended thrice for six months up to September 30, 2018. In September 2018, the government further extended the phase 1 of the FAME India scheme by another six months till March 2019 or till its second phase is approved. The government has withdrawn benefits available to conventional battery vehicles. As per a notification by Heavy Industries Ministry, the incentives under the extended scheme from October 1 will be available only for registered vehicles. Approximately 2,18,625 Electronic Vehicles were 'promoted' by FAME I till July 2018.

In December 2017, The Government of India shortlisted 11 cities to have electric vehicle based public transportation systems under this scheme. The shortlisted cities are Delhi, Mumbai, Ahmedabad, Bengaluru, Jaipur, Lucknow, Hyderabad, Indore, Kolkata, Jammu and Guwahati.

For more information please click [here \(https://www.fame-india.gov.in/\)](https://www.fame-india.gov.in/)

9.7. Technology Platform for Electric Mobility (TPEM) – a joint program of DHI and DST

TPEM is creating a collaborative platform for developers, suppliers, automakers to work together in five areas — lithium battery technology, motors and drives, charging infrastructure, drive cycle and traffic pattern, light-weighting of XEVs — and developing affordable electric technology, which will be open for

use by all in manufacturing two-wheelers, three-wheelers and commercial vehicles used for public transport. [Read more](#)

9.8. National E-Mobility Programme

In early 2018, the Ministry of Power launched the new National Electric Mobility Programme with aims to provide an impetus to the entire e-mobility ecosystem including vehicle manufacturers, charging infrastructure companies, fleet operators, service providers, etc.

According to the Ministry's [official statement](#), this e-mobility will be implemented by Energy Efficiency Services Limited (EESL) which will aggregate demand by procuring electric vehicles in bulk to get economies of scale. These electric vehicles will replace the existing fleet of petrol and diesel vehicles. EESL had procured 10,000 e-vehicles last year and will issue a new tender very soon for 10,000 more e-vehicles to cater to the growing demand. With these 20,000 electric cars, India is expected to save over 5 crore litres of fuel every year leading to a reduction of over 5.6 lakh tonnes of annual CO₂ emission. [Read more](#)

9.9. Green Urban Mobility Scheme

In March 2017, the Government of India launched a new eco-friendly scheme called 'Green Urban Transport' for improving and upgrading the public transport in urban areas along the low carbon pathway. The scheme will push for low carbon public urban transport and promote the use of hybrid/electric vehicles and non-fossil fuels including promotion of Non-Motorized Transport (NMT), public bike sharing, Bus Rapid Transit (BRT) systems, Intelligent Transport Systems (ITS), urban freight management etc. The scheme may provide a strong trigger for manufacturing of more fuel-efficient, hybrid, electric and low carbon/ clean-fuel based vehicles. The scheme will be implemented after the approval of the Cabinet. The scheme will help provide a sustainable framework for funding urban mobility projects with minimum recourse to budgetary support by encouraging innovative financing of projects. Under the Green Urban Transport Scheme (GUTS), the government would focus on creating non-motorized transport infrastructure, adoption of intelligent transport systems (ITS), increasing access to public transport, use of clean technologies and participation of private sector would be encouraged. The scheme will be executed with the help of private sector including assistance from the central and state governments under a seven-year mission with a total cost of Rs 70,000 crore (**9.33 Billion Euro**) for which 103 cities having more than 5 lakh population have been identified in the first phase. It is proposed that 10% amount will be contributed by Urban Local Bodies (ULBs) and 30% amount would be given each by Centre & States government and remaining 60% would be raised as loan by multi-lateral agencies. An initial amount of about Rs.25, 000 crore (**3.33 Billion Euro**) as central assistance, is proposed to be made available for the project.

For more information please [click here](#)

9.10. NITI Aayog Roadmap: Transformative Mobility Solutions for All

In 2017, the Government of India through extensive ministerial discussions came out with a major policy document in terms of "Transformative Mobility for All"

- Under the GST regime, EVs were kept at the 12% tax levels, while hybrids fell at the 43% levels (luxury products) - this has led to a lot of heartburn in the auto industry as major players have been focusing on hybrids. There are now representations to give more weightage to Hybrids as well and reduce GST on Hybrids.
- **Systems integration:** Enabling wide-scale adoption of mobility solutions through ubiquitous availability and sharing of interoperable transport data (ITD).
- **Scaled manufacturing:** Facilitating market creation through policies and mechanisms that enable manufacturing of electric vehicles (EVs) and necessary components in successive segments based on their market readiness.
- **Shared infrastructure development:** Better urban design, where a larger fraction of mobility demand is met by non-motorized transit and public transit, and access to vehicle-charging infrastructure enables higher penetration of EVs.

For more info please [click here](#)

9.11. Niti Aayog's agreement with IRF

Niti Aayog has signed an agreement with Geneva based International Road Federation (IRF) to cooperate in the field of Intelligent Transportation Systems (ITS) and to design a policy framework for the same. The National ITS policy will cover various sectors including traffic management, parking management, electronic enforcement of traffic rules and regulations. It would also cover fleet management and monitoring, and innovation and education in the field of ITS. A National ITS committee, constituted by NITI Aayog by associating all stake holders in collaboration with International Road Federation (IRF) is working on a strategy paper named “**National Intelligent Transport Systems (ITS) Strategy**”. This strategy paper is an attempt to understand how various ITS solutions can improve the quality of mobility in our country. SESEI Expert has submitted following inputs to this strategy paper:

- Section 3.5 on eCall introduction in brief
- Pune Municipal Corporation (PMC) set up case study of CGRAPs as part of 4.2.1 3.
- Section 5.5 on ITS Infrastructure (eCall)
- New Paragraph on Best Practices of ITS in Europe as part of **Selected Global Best Practices of ITS**
- Addition of table capturing ETSI Standards related to ITS.
- Addition of ITS related standards published by CEN/CENELEC in Europe.

9.12. TEC's technical reports

Telecom Engineering Centre (TEC) of Department of Telecommunications (DoT) has also come out with 9 technical reports on M2M detailing sector specific requirements/use cases to carry out gap analysis and future action plans with possible models of service delivery. Out of nine technical reports, two reports, related to intelligent Transport Systems (ITS) are as given below:

- i. [M2M Enablement in Intelligent Transport Systems](#)
- ii. [V2V/ V2I Radio communication and Embedded SIM](#)

This use case is a detailed description of one of the recommendations of the previous two reports in the area of M2M SIM and Digital Identity. A brief quote from the previous Study report is reproduced below:

- **Embedded SIM:** The normal SIM card is not suitable for harsh conditions of vehicles like vibrations, temperature, and humidity. GSMA has created specifications for embedded M2M SIM, for remote Over-the-Air (OTA) provisioning, hermetically sealed or installed in hazardous or remote locations. It can withstand temperature variation for automotive grade temperature range of -40 degree to +125 degree Celsius. Embedded SIM technology offers big opportunities for auto manufacturers as the lifecycle of an eSIM is, on averages, 10-15 years. International standards for eSIM have evolved.

One of the challenges identified in the ITS Technical Report related to the Know-Your customer process for issuance of the M2M SIM.

- Know-Your-Customer (KYC) norms for the M2M SIM used in ITS Devices (GPS/ GPRS etc.) may be different than the KYC norms for SIM being used for mobile phone. Currently, there is no mechanism to ensure vehicle ownership transfer is in sync with the device SIM connection, which needs to be addressed.

This working group has looked into the technology and its enablement for the Intelligent Transport sector, including the requirements and standards for M2M SIM, and the processes required to proliferate the M2M / IoT Use Cases. This use case addresses the use of Digital Identity and M2M SIM for Vehicle Identification, Registration, Transfer and Tracking using National Identity Database for the purpose of online authentication of an individual/Company/Vehicle.

9.13. TSDSI's Technical report

Telecommunication Standards Development Society, India (TSDSI) has also released a technical report [“M2M Use Cases for Transportation V0.2.0 20151003 advance for NWG”](#) in February 2016. The objective of this report is to lay emphasis on a national ITS roadmap, and create a sustainable model for deployment. This report is available [here](#) for downloading.

10. Technical Regulations

In India, the rules and regulations related to driver's licence, registration of motor vehicles, control of traffic, construction & maintenance of motor vehicles, etc. are governed by the motor vehicles Act (MVA), 1988 and the Central Motor Vehicles Rules (CMVR), 1989. The Ministry of Road Transport, Highway & Shipping (MoRTH&S) acts as a nodal agency for formulation and implementation of various provisions of the Motor Vehicle Act and CMVR. In order to involve all stake holders in regulation formulation, MoRTH&S has constituted three committees to deliberate and advise the ministry on issues relating to safety and emission regulations, namely –

- CMVR- Technical Standing Committee (CMVR-TSC)
- Standing Committee on Implementation of Emission Legislation (SCOE)
- Automotive Industry Standards Committee (AISC)

These committees advise MoRTH&S on various technical aspects related to CMVR. These committees have representatives from various organisations namely, **Ministry of Heavy Industries & Public Enterprises**

(MoHI&PE), MoRT&H, Bureau Indian Standards (BIS), testing agencies such as Automotive Research Association of India (ARAI), Vehicle Research Development & Establishment (VRDE), Central Institute of Road Transport (CIRT), industry representatives from Society of Indian Automobile Manufacturers (SIAM), Automotive Component Manufacturers Association (ACMA), Tractor Manufacturers Association (TMA) and representatives from State Transport Departments. [Read more](http://www.siamindia.com/technical-regulation.aspx?mpgid=31&pgidtrail=32)
(<http://www.siamindia.com/technical-regulation.aspx?mpgid=31&pgidtrail=32>)

The automobile industry has to address the following issues at all stages of vehicle manufacturing:

- Environmental Imperatives
- Safety Requirements
- Competitive Pressures
- Customer Expectations

There is a strong interlinkage amongst all these forces of change influencing the automobile industry. These have to be addressed consistently and strategically to ensure competitiveness. Since pollution is caused by various sources, it requires an integrated and multidisciplinary approach. The different sources of pollution have to be addressed in an integrated approach to achieve the objective of cleaner environment and meet National Air Quality standards.

The parameters determining emission from vehicles are:

- Vehicular Technology
- Fuel Quality
- Inspection & Maintenance of In-Use Vehicles
- Road and Traffic Management

While each one of the four factors mentioned above have direct environmental implications, the vehicle and fuel systems have to be addressed as a whole as requisite fuel quality is required to meet the emission standards. [Read more](#)

Environmental imperatives and safety requirements are two critical issues facing the automotive industry worldwide. Indian Automobile Industry in the last decade has made significant progress on the environmental front by adopting stringent emission standards, and is progressing towards technical alignment with international safety standards. Vehicles manufactured in the country have to comply with relevant Indian Standards (IS) and Automotive Industry standards (AIS). Indian Standards are being issued since the late 1960s and these standards for Automotive Components were based on EEC/ISO/DIN/BSAU/FMVSS, etc. at that time.

India signed the UN WP 29 1998 Agreement in February 2006. It continues to actively participate in the Global Technical Regulation (GTR) formulation by contributing data and subject matter expertise. SIAM members chair the different expert groups formed to formulate India stance on the various safety regulations. This has helped in development of GTRs taking into consideration the traffic and driving conditions in the developing countries.

India has currently more than 70% safety regulations which are either partially or fully technically aligned with GTRs and UN Regulations while retaining Indian specific driving and environmental conditions. Regulations are reviewed periodically by AISC and amendments are recommended to the Technical standing Committee on CMVR for adoption and subsequent notification by MoRT&H under the CMVR.

The current traffic conditions, driving habits, traffic density and road-user behaviour necessitate that maximum safety be built into the vehicles. Progressive tightening of safety standards taking into account unique India requirements has been addressed in the roadmap with a view to reduce the impact of accidents, thereby improving safety of the vehicle occupants and vulnerable road users. [Read more](#)

11. Government

11.1. Ministry of Road Transport and Highway

An apex organisation under the Central Government is entrusted with the task of formulating and administering, in consultation with other Central Ministries/Departments, State Governments/UT Administrations, organisations and individuals, policies for Road Transport, National Highways and **Transport Research** with a view to increasing the mobility and efficiency of the road transport system in the country. The Ministry has two wings: Roads wing and Transport wing.

Ministry Transport Wing deals with matter relating to Road Transport and is responsible for such as:

- [Central Motor Vehicle Rules.](#)
- Administration of the [Motor Vehicles Act.](#)
- [Notifications under Motor Vehicle Legislation](#)
- Promotion of Transport co-operatives in the field of motor transport.
- Evolves road safety standards in the form of a National Policy on Road Safety and by preparing and implementing the Annual Road Safety Plan etc.

11.2. Ministry of Heavy Industries & Public Enterprises

The Ministry of Heavy Industries and Public Enterprises, is a Union Ministry under Government of India and comprises of the Department of Heavy Industry and the Department of Public Enterprise. The Ministry focuses on promoting the development and growth of capital goods, auto, power equipment, manufacturing and engineering industry in the country, framing of policy guidelines for Central Public Sector Enterprise (CPSE). Under the Ministry, the Department of Heavy Industry is concerned with the development of the engineering industry viz. machine tools, heavy electrical, industrial machinery and auto industry and administers 32 operating CPSEs. The Department of Heavy Industry seeks to achieve its vision of global automotive excellence through creation of state-of-the-art Research and Testing infrastructure through the National Automotive Testing and R&D Infrastructure Project (NATRIP). The Department of Heavy Industry seeks to achieve its vision by providing necessary support to the Auto, Heavy Engineering, Heavy Electricals and Capital Goods Sector.

12. Standardization

12.1 Bureau of Indian Standards (BIS)

12.1.1. Transport Engineering Division Council (TEDC)

In the Indian Automotive sector the main bodies to engage in the standards formulation is the **Transport Engineering Division Council (TEDC)** of **Bureau of Indian Standards (BIS)**. Standardization in the field of transport engineering including air, water, road and rail transport; diesel engines for stationery application and ISO freight containers, transport packaging etc. falls under the purview of TEDC. This division council has set up its subcommittee [TED-27](#) specially for developing standards for Electric and Hybrid vehicles which has produced **IS 15886** for standardization of Electric and Hybrid vehicles and their components.

This Division Council has also formed a special group TED 28 which has published **IS/ISO 21214 : 2015 Intelligent Transport Systems – Communications Access for Land Mobiles (CALM) – Infra-Red Systems.**

TEDC has published more than 1100 standards through its subcommittees. To be precise nearly 345 Indian standards are dual numbered (Identical) and 27 standards are modified standards.

A full list of published standards and Underdeveloped Standards by this division council of BIS are available at <http://164.100.105.199:8071/php/BIS/StandardsFormulationV2/pow.01.php>

12.1.2. Electro technical Division council (ETDC)

Electro-Technical Division Council (ETD) of BIS is responsible for Standardization in the field of electrical power generation, transmission, distribution and utilization equipment; and insulating materials, winding wires, measuring and process control instruments and primary and secondary batteries. ETD has set up a subcommittee called [ETD-51](#) specially for developing EV infrastructure standards. It has 35 participating agencies from automotive, electrical & electronics fields. ETD 51 has published **IS 17017 (Part 1)** for standardization of Electro-technology in Mobility.

This division council of BIS has published almost 1600 standards through its subcommittees. To be precise nearly 1529 Indian standards are dual numbered (Identical) and 47 standards are modified standards. Exhaustive list of published standards and Underdeveloped Standards by this division council of BIS are available at <https://services.bis.gov.in:8071/php/BIS/StandardsFormulationV2/pow.01.php>

12.2. Automotive Research Association of India (ARAI)

Automotive Research Association of India (ARAI) is a co-operative industrial research association established by the automotive industry with the Ministry of Industries, Government of India. ARAI provides technical expertise in R&D, testing, certification, homologation and framing of vehicle regulations. Its Automotive Industry Standards Committee (AISC) is set up under Central Motor Vehicles Rules -Technical

Standing Committee (CMVR - TSC) by Ministry of Road Transport & Highways, Dept. of Road Transport & Highways (MoRT&H, DoRT&H)) in the year 1997 to review the safety in the design, construction, operation and maintenance of motor vehicles. Technical Secretariat to WP.29 was entrusted to ARAI in the year 2003, and its National Standing Committee on WP.29 establishes national policy and guidelines on the subject of harmonization of automotive regulations. India is also a signatory to 1998 agreement, under which, the country is committed to participate in formulation of Global Technical Regulations. ARAI has 6 GR groups (subsidiary technical bodies of WP.29) are:

- GRPE (India) : Working Party on Pollution and Energy
- GRSG (India) : Working Party on General Safety Provisions
- GRRF (India) : Working Party on Brakes and Running Gear
- GRE (India) : Working Party on Lighting and Light-Signaling
- GRB (India) : Working Party on Noise
- GRSP (India) : Working Party on Passive Safety

The Indian working groups consist of experts from the industry, test agencies and other organizations and deliberate on various subjects / regulations falling within their purview and submit their recommendations to the national secretariat for further actions.

The ARAI drafted several standards that are related to electric mobility and ITS including the following:

- [AIS-138 \(Part 1\)](#): Electric Vehicle Conductive AC Charging System
- [AIS-138 \(Part 2\)](#): Electric Vehicle Conductive DC Charging System
- [AIS 131](#) on Type Approval Procedure for Electric and Hybrid Electric Vehicles introduced in market for Pilot / Demonstration Projects intended for government schemes.
- AIS-123 on CMVR Type Approval of Hybrid Electric System Intended for Retro-fitment
- ARAI has also published Automotive Industry Standard (AIS) document including AIS-102 (Part 1 & 2) on CMVR Type Approval for Hybrid Electric Vehicles.
- [AIS-140](#) for ITS requirements for public transport operations, which also includes specifications for autorickshaws.

List of Published standards by ARAI are available at https://www.araiindia.com/Publish_AIS_Standards.asp and Draft Standards are available at https://www.araiindia.com/Draft_AIS_Standards.asp.

For information of Indian Emissions Regulations please visit at https://www.araiindia.com/pdf/Indian_Emission_Regulation_Booklet.pdf

12.3. Ministry of Heavy Industries, Department of Heavy Industry (DHI)

In late 2017, the Ministry of Heavy Industries instituted “Committee on Standardization of Protocol for Electric Vehicles” to develop specifications for public chargers for such vehicles – submitted its report to the Govt. Of India. The Committee has come out with recommendations in the form of specifications for AC and DC chargers for electric vehicles namely **Bharat EV Charger AC-001** and **Bharat EV Charger DC-001**.

These specifications are intended to cater to the immediate need of existing and announced electric 2 W, electric 3W and passenger cars/vehicles having battery voltage less than 100 V. [Read more/Download](#)

For more information on the automotive sector standardization please refer information available at project website <http://sesei.eu/> and our earlier published report “[Indian Standardizations Landscape Report](#)”.

13. Conclusion

India's automotive industry is one of the most competitive in the world. It is not surprising that the market for passenger, commercial vehicles, three wheelers and two wheelers in India has witnessed remarkable growth over the last decade. As the Indian automobile industry aims to be among the world's top three in automobile manufacturing by 2026, e-mobility and ITS by far is the greatest opportunity for the Indian industry to do so. **India has a lot to gain by converting its internal combustion engine (ICE) vehicles to EVs at the earliest, the report titled ‘[Zero Emission Vehicles \(ZEVs\): Towards A Policy Framework](#)’ suggested.** By transitioning to EVs, India can save up to Rs. 20 Lakh CR. (~235 euro billion) in oil imports and nearly 1 Gigatonne of carbon dioxide (CO₂) emissions by 2030, according to a [report by FICCI and Rocky Mountain Institute](#). A mentioned above government of India has set its ambitious target of having 100% electric vehicle fleet by 2030 and to achieve the same various initiatives such as NEMMP, FAME, GUTS are being taken by government to promote and to encourage the adoption of EVs. Government is also taking steps towards building a sustainable EV ecosystem.

India is also a member of the Electric Vehicles Initiative (EVI) multi-governmental policy forum. The EVI forum was established in 2009 to accelerate the deployment of electric vehicles worldwide and facilitate exchanges between policymakers and various stakeholders. Countries currently active in the EVI include Canada, China, Finland, France, Germany, India, Japan, Mexico, the Netherlands, Norway, Sweden, the UK and the US. The initiative is jointly led by Canada and China. The International Energy Agency serves as the EVI coordinator.

Despite various proactive steps, serious concerns still remain: lack of adequate charging infrastructure, range anxiety (mileage between each charge) and the higher initial cost compared to fossil fuel variants. Consumer mind sets can't address those problems since they require governmental support and solutions. Automotive players must explore ways to reduce battery cost, charging time and to increase driving range.

India should consider signing a memorandum of understanding with appropriate countries for a continuous supply of raw materials. Argentina recently showed interest in helping India in providing lithium but we have not made any progress towards collaborating with any country so far. Organizations like the International Solar Alliance (ISA), initiated by India and France, can play a significant role in facilitating such trade. For example, ISA member countries like Australia, Chile, Brazil, Ghana and Tanzania are rich in lithium reserves. Similarly, nations such as Congo, Madagascar, and Cuba can partner for supply of cobalt; Burundi, Brazil, and Australia are rich in nickel reserves.

Key standardization bodies of India (BIS & ARAI) and their partners work towards developing standards that take into account the uniqueness and complexity of the transport system in India. These local requirements should be tabled at global standardisation platforms for their harmonisation. This will help India in creating

common standards while accounting for the Indian uniqueness and complexity, which in turn will ensure its interoperability, bring economies of scale and hence the affordability.

For additional information on Automotive Standards & Policy initiative covering e-Mobility and Intelligent Transport System (ITS) please click [here](#) and download the study report which was released during [3rd Indo European Conference of standards and Emerging Technology](#), held in April 2018 in New Delhi.

14. Glossary

Acronym	Expansion
ACMA	Automotive Component Manufacturers Association of India
AIS	Automotive Industry standards
AISC	Automotive Industry Standards Committee
AMP	Automotive Mission Plan
ARAI	Automotive Research Association of India
ATMA	Automotive Tyre Manufacturers' Association
BRT	Bus Rapid Transit
BS	Bharat Stage
BU	Billion unit
CAGR	Compound annual growth rate
CMVR	Central Motor Vehicles Rules
CMVR - TSC	Central Motor Vehicles Rules -Technical Standing Committee
DIPP	Department of Industrial Policy and Promotion
EVs	Electric vehicles
FAME	Faster Adoption and Manufacturing of Hybrid and Electric vehicles
FDI	Foreign direct investment
FY	Fiscal year
GDP	Gross Domestic Product
GTR	Global Technical Regulation
GUTS	Green Urban Transport Scheme
IS	Indian Standards
ITS	Intelligent transport systems
LCV	light commercial vehicle
M&HCVs	Medium & Heavy Commercial Vehicles
M&M	Mahindra and Mahindra
MoRTH&S	Ministry of Road Transport, Highway & Shipping
MVA	Motor vehicles Act
NATRIP	National Automotive Testing and R&D Infrastructure Project

NEMMP	National Electric Mobility Mission Plan
NMT	Non-Motorized Transport
OEMs	Original Equipment Manufactures
PVs	Passenger Vehicles
R&D	Research and development
SIAM	Society of Indian Automobile Manufacturers
SUVs	Sport-utility vehicles
SVT	Smart vehicle technology
TEDC	Transport Engineering Division Council
TMA	Tractor Manufacturers Association
TPEM	Technology Platform for Electric Mobility
USD	United States dollar
UVs	Utility vehicles
YoY	Year over year

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