Automotive sector-

Human resource and skill requirements 2026

AUTOMOTIVE SKILLS DEVELOPMENT COUNCIL

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01

In the next decades, the automotive industry will undergo a substantial transformation: the vehicles it build, the companies that build them, and the consumers who buy them will be significantly different

02

Disruptive changes brought in by technology advancements are drastically changing the current job landscape with the impact ranging from job creation to job displacement and increased labour productivity to widening of skill gaps.

03

The future workforce will need to work on a series of non-routine tasks would require social intelligence, complex critical thinking, and creative problem solving to remain relevant in the auto industry.

Foreword

Nikunj Sanghi
Chairman,
Automotive Skill Development Council

ASDC's mission is to help Indian automotive sector develop a deeper understanding of the evolution of technology and market-driven skill requirements and to provide a fact base that contributes to decision making on critical management and policy issues.

The Indian automotive industry is one of the fastest-growing markets of the world and contributes significantly to the country's manufacturing eco-system. But at the same time, the sector faces technological and structural changes. This will challenge the human resource readiness to perform at par with the increase in technology, capital investment, and market changes.

Government of India understands these challenges and recognizes the need for India to keep up with the pace of globally emerging trends. To address these challenges, we publish the "Human Resource and Skill Requirements in the Automotive sector (2026)" which is an India specific research study on the human resource requirement in the automotive sector. It provides a vision of the change in job market in India over the next 7 years, by offering a consolidated view of the impact that various primary forces such as Industry 4.0, shift towards Electric Vehicles (EVs), changing market demand and government policy interventions are expected to have in the key sub-sectors of the automotive industry.

The adoption of Electric vehicles (EVs) is one of the biggest and fastest growing global phenomena in the automotive industry. India, too, is catching up with the trend by launching commercially viable EV options for the Indian customers and plans to become an all-electric fleet by 2030. The MSMEs particularly the tier 3 & 4 auto component manufacturers and road-side mechanics would be impacted the most and would gradually be required to re-evaluate their business model.

The emergence of new products and technologies require an extensive upskilling & reskilling of the existing workforce and the introduction of new roles for the industry to sustain growth and the future workforce to remain relevant in the auto industry. Consequently, hiring efforts at automotive industries need recalibration as the workforce will continue to play a critical role and be a key differentiator.

We expect this report to be useful for policymakers, corporations/business entities, as well as education and skilling institutes.

We look forward to your feedback on the report. For more information on the work of the Automotive Skill Development Council, it's various initiatives and programs on skills please visit our website www.asdc.org.in or write in to info@asdc.org.in.

Foreword

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Automotive industry is one of the main driving forces for the Indian economy. Accounting for around 7% of India's overall GDP the sector employs 32 million workers. At the same time, the sector is facing numerous structural changes including stricter emission and safety norms as a part of BS6(Bharat Stage 6), changing customer preferences and technological disrupters making the industry currently stand at an inflexion point.

This report outlines the critical need for leveraging human capital in the automobile sector and explores a wide range of opportunities and challenges that exists towards realizing the full potential of technology and government initiatives like "Make in India", "Automotive Mission Plan (AMP) 2016-26", "FAME", etc.

This report delves into the three major themes of skill development, building blue-collar workforce capability and understanding technological disrupters like Industry 4.0 which has proven to be a paradigm shift in manufacturing, involving a high level of automation and redefining an irreversible shift in the structure of jobs.
We have observed, that in the last few quarters of 2019 the industry has started to experience a difficult period and has witnessed job losses in sub-sectors depended directly on production and sales of vehicles. However, given the new initiatives and prospects in the sector, we expect things to bounce back soon.

Our research shows that dealerships and road transport sub sectors hold the maximum demand for job opportunities, but they also experience the maximum shortage of skilled manpower due to lack of supply side institutions. Sub sectors such as vehicle servicing and auto component would experience maximum impact on jobs due to trends like vehicle electrification, mechatronics, Industry 4.0, etc and will require major re-selling to be future relevant.
The government along with industry associations and Automotive Sector Skill Development Council is already taking many initiatives in the skill ecosystem by investing in manpower-intensive infrastructures like PMKKs, apprenticeship schemes like NAPS, micro-entrepreneurship models and encouraging start-ups. It may need to focus more on certain sub-sectors of the automotive industry with higher employment elasticity to catalyse job creation, effect reforms in education and skills to create a large Industry 4.0 compliant workforce and create enabling policies to drive rapid industry adoption of Industry 4.0 technologies. The industry needs to focus on rapidly restructuring their business models considering these technologies to ensure competitiveness and to drive large scale reskilling of the existing workforce.

We would like to thank SIAM, ACMA, FADA & ASDC for providing us with the opportunity to conduct this research study. We also acknowledge and appreciate the efforts of all automotive sector companies and other stakeholders who invested their time to complete the surveys and sharing their inputs.
We hope you find the report useful and we look forward to your feedback, please write into anurag.malik@in.ey.com and arunkumar.pillai@in.ey.com

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Abbreviations

FAME	Faster Adoption and Manufacturing Of (Hybrid &) Electric Vehicles
CAFÉ	The Corporate Average Fuel Economy
TVET	Technical and Vocational Education and Training
NEET	Not in Education, Employment, Or Training
OEM	Original Equipment Manufacturer
ASDC	Automotive Skills Development Council
FADA	Federation of Automobile Dealers Associations
SIAM	Society of Indian Automobile Manufacturers
ACMA	The Automotive Component Manufacturers Association of India.
ITI	Industrial Training Institute
DHI	Department of Heavy Industry, Ministry of Heavy Industries & Public Enterprises, Government Of India
CBU	Completely Built Units
CKD	Completely Knocked Down Units.
CMIE	Centre for Monitoring Indian Economy
ICE	Internal Combustion Engine
BEVs	Battery Electric Vehicle
SCADA	Supervisory Control and Data Acquisition

MES	Manufacturing Execution System
CAM	Computer-Aided Manufacturing
MoRTH	Ministry of Road Transport And Highways (India)
RFID	Radio Frequency Identification
FASTag	Fastag is an electronic toll collection system in India, operated by the National Highway Authority of India (NHAI)
GCC	Gulf Cooperation Council
QCP	Quick Care Point
MOOC	Massive Open Online Course
GOI	Government of India
NOSs	National Occupational Standards
PMKVY	Pradhan Mantri Kaushal Vikas Yojana
DDU-GKY	Deen Dayal Upadhyaya Grameen Kaushalya Yojana

Executive summary

The present workforce does not possess the skills that will be required with the arrival of new industrial trends. The limited options that industries have is to turn to robots/ automation or reskill the existing workforce. The most pertinent aspect for sustaining the high growth of the sector is to create a future ready workforce by bridging the gap that exists on the demand and supply side of manpower, addressing the scale and quality paradigms.

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The global automotive market is undergoing a rapid transformation and India is not oblivious to this phenomenon. The sector is getting impacted by a diverse set of forces - demand for environmentally sustainable mobility solutions, changing consumer preferences, digitization across the automotive value chain and the emergence of Industry 4.0 technologies. These trends have not only enabled firms to improve efficiency and technological innovations but have simultaneously required firms to bring innovations not only in traditional mobility solutions but to bring disruptive solutions like electric mobility solutions, autonomous driving vehicles and a slew of social mobility innovations. The automobile industry is likely to feel the dampening effect the new mobility concepts will have on car sales.

An important aspect of this transformation is that it is taking place at a time when the industry is dominantly depending upon powertrain technology, i.e., combustion engine and transmission. In the emerging reality, the share of powertrain is either reduced or even vanishes completely. This together with changing consumer preferences, emergence of new mobility solutions such as car-sharing, bike-sharing, dynamic car-pooling is significantly impacting the growth prospect of the sector and its human resource requirements. Evidence of this phenomena can be witnessed in the current stagnation and decline is automobile sales.

The Indian automotive sector is also witnessing a similar scenario with a decline in vehicle sales, maturation of cab aggregation models and the advent of connected cars and electric vehicles. The decline in sales number is new to the sector, which has seen a continuous rise in sales over the past 18 years. The steep decline in automotive sales has concurred with the government's new policies focused on promoting sustainable mobility solutions. However, the current stimulus and incentives announced by the government are expected to provide the much-needed breather to the sector in these pressing times and the sales are therefore expected to rebound in coming times.

The future of automotive industry in India will be determined by the sector's response to the inevitable impact created by the interplay of three key trends impacting the Indian market:

- **Manufacturing trends:** Exponential technologies are touching each element of the value chain in the automotive sector. Industry 4.0 technologies such as autonomous robots, 3D printing, industrial IOT, machine learning and artificial intelligence started to revolutionize the automotive sector. These technologies have dramatically driven industrial productivity. In India, the impact of one specific Industry 4.0 technology that is being felt is industrial IoT. The system is promoting the rise of connected factories wherein the machines can interact with one another, configure themselves and adapt to changes. Industrial IoT along with other technologies are integrating entire automotive value chain bringing significant productivity gains. The impact has been inform of greater automation, displacement of lower skilled human resource and requirement of higher-skilled labor for managing these exponential technologies.
- **Policy initiatives:** A consensus has emerged within the policy arena and among consumers that automobile players need to become environmentally sustainable through innovations in mobility solutions that reduce greenhouse gas emissions. Diesel engines are currently facing a particular problem. The demand for a cleaner environment and the stringent sustainability norms are bringing a sweeping change in the composition of automobiles as well as their manufacturing processes. The key trends observed due to this megatrend in the industry are as follows:
  - Electric vehicles
  - Stringent pollution and other environment related norms

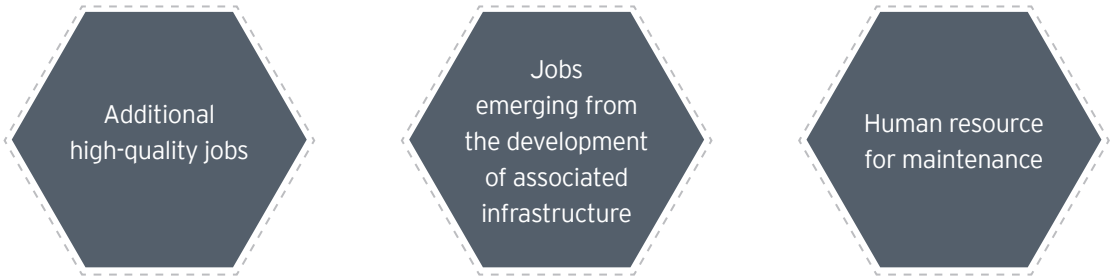
Regulators and the Judiciary have become proactive in regulating the environmental impact of the automotive sector. The migration from BS IV emission levels to BS VI, FAME policy, CAFÉ norms are examples of policy initiatives disrupting the automotive sector in India.

- **Changing market demand:** Launch of smart, connected vehicles means there are more electric parts in newer vehicles. OEMs/Auto component manufacturers now require both mechanical and electric engineers, IoT specialists and data analysts. However, not many threatened job roles are anticipated due to this trend as vehicles are still largely mechanical. Further, with population increasingly shifting to urban cities and people becoming more cost conscious, shared mobility and ride sourcing platforms have acquired a rampant development pace.

These trends are expected to give way to changes in the production process, emergence of new business models, newer sales and service delivery models along with reconfiguration of workforce strategies. Further, there is a lot of negative sentiment in the market around the jobs loses because of adoption of Industry 4.0. Towards this it is necessary to remind ourselves that there is a distinction between the potential of Industry 4.0 automation and actual adoption of Industry 4.0. While a significant share of vehicle production process has the potential to be automated, the actual adoption will depend upon on the interplay of a host of complex factors including the supply of cheap labor in the Indian market, skill level of current and future workforce, policy intervention for automation and associated job losses, labor laws, availability of ancillary infrastructure and societies perception towards technological innovations.

The shift from the internal combustion engine (ICE) to electric vehicles is being viewed as a market disruptor. This shift is expected to have a major change in the nature of jobs throughout the automotive value chain. Some job losses are expected since the manufacturing process for ICE based vehicles differ significantly from the electric vehicles that require fewer parts. This will have a major impact on the business of auto component manufacturers as they will have to make a major shift from their current business of supplying engine parts, gearbox, exhaust pipes, etc. to battery, electric motors, etc. This will lead to the emergence of new players in the value chain.

It is believed that there will a net increase in the number of jobs in the sector on account for three reasons: new technology infusion in the sector providing:



Our analysis suggests that the current employees will have to be skilled to match the automotive sector's evolving requirements. Electric vehicles will have a profound impact on the mix of automotive workforce at OEMs and auto component manufacturers.

One of the major transformations is being witnessed in the dealership segment. The rise of digitization and increasing population of millennials is reshaping the automobile sales experience and firms have responded with a commitment to increase the digital footprint and attempting to shift their focus to individual customer needs, prioritizing retention and relationship management. More than ever, customer retail interaction is becoming one of the key aspects of dealership development. Today personalization is becoming critical to consumers who need personalized relationship management or a concierge. As a result, it is expected that value creation will shift towards creating capabilities pointed towards the customer interface and less towards manufacturing the physical product. This has led to automotive players building a seamless omnichannel presence, exploiting data analytic capabilities, utilizing top-up digital services and skilling employees to become trusted advisors to the customers. The skilling of the dealership workforce needs to be taken at an unprecedented pace with the rapid change in customer service expectations and increased awareness. The dealership workforce needs to be trained not only on the nuances of emerging technologies such as connected cars, IoT but also on how to personalize the customer purchasing journey. The customer facing employees shall be appraised of the critical nature of customers' needs, desires and character even before the start of their interaction.

The road transport segment is getting impacted by the rise of shared mobility. Despite its late start, shared mobility is becoming a common place and is emerging as a viable employment provider to the driver segment. The rise of shared mobility is also transforming the nature of automotive market by offering consumers an option against personal ownership of vehicles.

The road transport sector comprises of the majority of the workforce in the automotive sector. However, despite constituting a major share in employment this segment has been least focused by industry and government alike. The sector has often demanded the pressing need to frame better human resource policies to create competent workforce and attract people to join the sector. The working conditions of the drivers can be described as pathetic, with drivers subjected to long driving hours away from home over extended period. They often do not have proper access to basic facilities dehumanizing the job of drivers making it unattractive. Further, research suggests that due to non-transparent driver licensing system, drivers joining the workforce are not adequately skilled. Industry executives have voiced their concern on driver training infrastructure being inadequate.

Further, the survey conducted during this study indicated that because of massive inefficiencies across the automotive value chain, India has a high potential for automation. However, with the majority of the value addition taking place in auto component sub-sector which engage relatively low skilled to unskilled workforce. This makes a strong case for suggesting that it is unlikely that Indian automotive sector will experience a massive job loss because of adoption of Industry 4.0 technologies. Further, the supply of cheap labor force will continue to hold the pivot for Indian automotive workforce against any disruptive adoption of exponential technologies. However, jobs within OEMs are expected to see a change in the skill set due to the organized nature and potential for automation of the OEMs.

Major concern of the industry is currently focused on the skill shortage and the ability of the current workforce to adapt to the changing industry dynamics. The pace of change in technology and changing consumer demand patterns are leading to potential skill gaps. Our interaction with the industry executives suggested that apprenticeship can be a robust program in meeting the qualified workforce requirements. However, a deeper investigation suggested that the current practice of implementing apprenticeship programs in the automotive sector is prevalent only among the OEMs, tier 1 and tier 2 auto component manufacturers. The apprenticeship system within these segments is well established because of them being pioneers in the country in undertaking apprenticeship as a method to supplement workforce demand. Discussion with the employers suggested that as apprenticeship is driven by employer demand the chances of mismatch between skills taught and skills demanded in the work place are less likely to occur than when training is provided in school, Industrial Training Institute (ITI) or polytechnic-based course.

However, within the aforesaid segments too apprenticeship programs are initiated and managed exclusively by the sectors players and are disassociated with apprenticeship promotions schemes of the government like National Apprenticeship Promotion Scheme (NAPS), National Employment Enhancement Mission (NEEM), Employability Enhancement Training Program (EETP) among others. In light of the fact that major employment providing segments of the automotive sector's - dealership sales and service being completely oblivious to apprenticeship programs, it is important to expand the scale of apprenticeship training within these segments and provide more workers to enter formal employment routes.

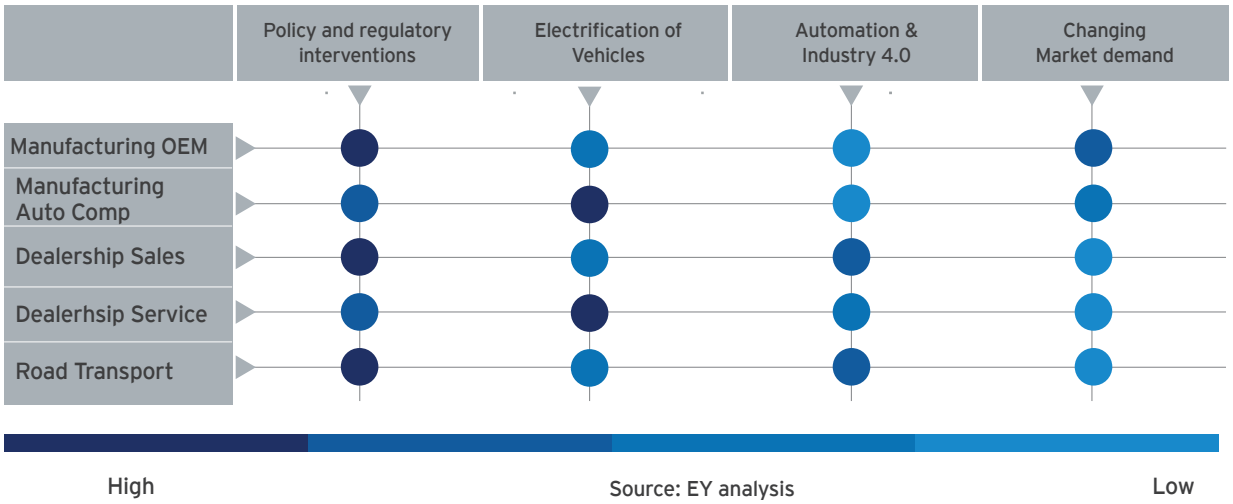
Further, with the nature of manufacturing continuously changing across the automotive value chain, sector players have highlighted their critical focus on re-skilling of the current talent and paving the way forward for their skills upgrade. The sector is seeing a renewed interest in up-skilling and re-skilling of the current workforce across the sector with multiple initiatives aimed at building a learning culture within their workforce.

Our analysis on the supply side of the spectrum of the automotive sector suggested that the sector players mainly meet their workforce demand through higher education sector, technical and vocational education segment and Not in Educational and Employment (NEET) segment.

Besides the NEET segment, an analysis of the other two segments, viz: higher education and TVET suggested that these segments differ in many ways, particularly in learning approach and student profiles, where as TVET learning is competency based and the higher education is knowledge based. The sector's learning and instruction modes are closely linked to the desired employment outcomes for each sector's graduates. Due to this reason the students coming out of these modes are mainly aspiring for jobs, either with OEMs or tier 1 auto component manufactures and to some extent with OEM owned/ larger vehicle sales dealerships. This scenario leaves the other major employment generating sectors - dealership services, tier -3 and tier- 4 auto component manufactures mainly dependent upon the NEET segment for meeting their workforce requirements. Interaction with players in lower tiers of auto component manufacturers, dealership sales and service players and transport fleet owners suggest the skilling infrastructure is currently highly constrained and lack capacity to meet demand. This makes a compelling case for the policy makers, sector players and the ASDC to develop skilling capacity for the NEET segment forming the major supply base for automotive sector.

Therefore, given the above background there is an immediate requirement to skill/upskill the workforce or the country may "automate before they educate", leading to jobless growth.

Figure 1- Trends affecting employment and value chain of the automotive sub-sectors



Source: EY analysis

In this report, EY brings together:

1. Primary research through extensive interactions with industry personnel;

2. Secondary research through detailed review of industry reports, news articles and expert opinions;

3. Numerical evidence through rigorous analysis by EY internal team of experts, to present a comprehensive report on the skill gaps in the Indian automobile industry.

The report is divided into four sub-sectors to accurately explore the technological and market trends that each sub-sector faces and the respective skills gap that must be bridged. We also track the demand-supply dynamics of each sub-sector to provide a better guide towards long term planning.

The sub-sectors are:

- 01 Manufacturing and R&D (OEM, auto component manufacturers, raw material suppliers)
- 03 Dealerships sales
- 03 Dealerships servicing
- 04 Road transportation

Table 1: Summary of new, endangered and reskilling jobs in the various sub-sectors of the automotive industry.

Sub-sectors of automotive industry	New jobs	Endangered jobs	Jobs which will require major reskilling
Manufacturing and R&D (OEM, auto component manufacturers, raw material suppliers)	▶ Electromechanical technician ▶ Electronics technician ▶ Networks and computer system applications ▶ Operators to manage robots and programming ▶ Equipment maintenance technician ▶ Operations and maintenance data analyst ▶ Industrial machine builder, mechatronics ▶ Motor control engineer	▶ Routing and simple assembly job ▶ Routine machine loading/ unloading ▶ Logistics –- internal material transfer and storage ▶ Paint application ▶ Manual spot welding ▶ Packing executive ▶ Welding assistant ▶ Production (forging) ▶ Tool room operator ▶ Production machining	▶ Machining ▶ Maintenance (mechanical and electric) ▶ Assembly and fitter (aggregate) ▶ Welders and body process ▶ Assembler and fitter ▶ CNC machining and casting
Dealership	▶ Home sales consultant ▶ Sales consultant for digital marketing ▶ Digital content writer ▶ E-outlet sales consultant	▶ Accessories manager ▶ Sales person ▶ Washing boy	▶ Sales consultant
Automobile service OEM authorized service centers and road side mechanics)	▶ Auto expert technician ▶ Advance paint technician ▶ Battery technician ▶ Electric vehicle technician ▶ Predictive analyst	▶ Engine repair technician ▶ Service technician ▶ Sanding and priming jobs	▶ Service technician
Road transport: EV charging station	▶ Charging attendant/ Station supervisor ▶ Car washer/ tyre inflator/ puncturers repair ▶ Security guard ▶ Field Failure failure Analysis analysis engineer ▶ Customer support engineer		
Road Transport (New Skills required by commercial vehicle and cab drivers as a complementary skill to driving.)	▶ Hospitality ▶ Loading/Unloading ▶ Handling hazardous materials ▶ Basic mechanics ▶ Tablet computer training ▶ Financial management ▶ Vehicle detailing ▶ Self-motivation training ▶ Transportation management training		

Source: EY Analysis

1.1. Summary of manpower projections from 2019 till 2026

- The industry provided direct and indirect employment to 32[1] million resources in 2018.
- By 2026 it is expected to employ 45.08 million people, creating an additional employment of around 35 million from 2019 till 2026[2].
  - Around 20 million jobs will be created due to year-on-year employee replacement.
  - Around 20 million jobs will be created due to year-on-year employee replacement.

Table 2: Projected employment 2019-2026

#	Sub Sector	2018	2019	2020	2021	2022	2023	2024	2025	2026
1	**Manufacturing & R&D**	**4.14**	**3.98**	**4.30**	**4.64**	**4.89**	**5.16**	**5.45**	**5.75**	**6.07**
1.1	OEM	.33	.30	.31	.32	.33	.34	.37	.40	.42
1.2	Auto comp	1.75	1.68	1.81	1.95	2.05	2.15	2.25	2.36	2.48
1.3	**RM**	2.06	2.0	2.18	2.38	2.52	2.67	2.83	2.99	3.17
2	**Dealership sales**	3.0	2.71	2.78	2.89	3.0	3.17	3.43	3.64	3.86
3	**Vehicle service total**	5.05	5.37	5.64	5.84	6.02	6.23	6.50	6.78	7.09
3.1	Authorised service center	2.0	2.12	2.23	2.31	2.38	2.47	2.57	2.68	2.80
3.2	Road side mechanics	3.05	3.25	3.41	3.53	3.63	3.76	3.93	4.10	4.29
4	**Road Transport**	17.22	18.68	19.93	20.96	21.88	23.08	24.63	26.26	28.06
Total		**29.41**	**30.74**	**32.65**	**34.33**	**35.80**	**37.64**	**40.01**	**42.44**	**45.08**

Source: EY analysis

[1] https://dhi.nic.in/writereaddata/DHI_2017-18_annual_report/files/downloads/HEAVY%20ENGLISH%20ANNUAL%20REPORT%202017-18.pdf

[2] EY Analysis

Table 3: Incremental human resource requirement from 2019-2026

#	Sub Sector	Additional employment through natural growth	Replacement	Total
1	**Manufacturing & R&D**	1.93	1.61	3.55
1.1	OEM	.09	.11	.21
1.2	Auto comp	.73	.67	1.94
1.3	**RM**	1.11	.83	2.18
2	**Dealership sales**	.86	1.03	1.89
3	**Vehicle service total**	2.09	1.99	4.08
3.1	Authorised service center	.83	.79	1.61
3.2	Road side mechanics	1.26	1.20	2.46
4	**Road Transport**	10.84	15.53	26.36
Total		**15.72**	**20.16**	**35.88**

Source: EY analysis

Summary of recommendations

02

2.1. Summary of recommendations for the government

- Support the competitiveness-enhancing initiatives of corporates to spur growth in the sector and employment
- Support in the workforce capacity building of sub-sectors – vehicle services and commercial vehicle drivers by linking it to the Skill India Mission
- Promote apprenticeship among largely unorganized tier 2 and tier 3 auto-competent manufacturers and unorganized vehicle service segment
- Promote the recognition of prior learning (RPL) route to create alternative career pathways
- Make the job of a commercial driver aspirational by investing in their capacity building and improving their working conditions
- Support the different sub-sector in their capacity building on utilizing their in-house training capacity for up-skilling and re-skilling
- Support skilling of industry workforce on skilling on Industry 4.0
- Collaborate with and incentivize industry for skilling on Industry 4.0
- Create fund to promote joint new technology or business model proposals from industry and academia
- Formulate life-long learning strategies and drive behavioral change among citizens toward life-long learning

2.2. Recommendation for the industry

- Create collaborative learning ecosystems for the automotive sector
- ASDC, in collaboration with industry players and institutional partners, must forge an integrated framework to meet the imminent future that skill demand encompasses.
- Develop workforce re-training programs across organization levels
- ASDC to support the unorganized segment: tier 3 and tier 4 auto component manufacturers dealership service in aggregating their workforce demand for apprenticeship
- ASDC to support and actively engage the labor-intensive sub-sectors such as dealership sales and service
- Industry needs to contribute towards the goal of creating future ready skilled manpower
- Work in close partnership with the Government to ensure success of its efforts to take advantage of Skill India Mission
- Evaluate building Centers of Excellence on emerging technologies
- Industry–academia collaboration for better demand-supply matching
- Industry led upgradation of qualification packs
- Engage unorganized road side garages to skilling initiatives
- Implement job rotation
- Support the largest employment proving segment of commercial drivers

2.2. Recommendation for the industry

- Collaborate with industries
- Program upgradation of ITIs
- Focus on cognitive/judgement-driven skills

Background

The automobile industry is instrumental in shaping the country's economy and hence rightfully regarded as a Sunrise Sector under Make in India. India's GDP growth rate is likely to be at a three-year high of 7.3% in 2019-20 after picking up to 7.2 % in 2018-19[3]. The automotive industry is a significant contributor to the national economy comprising over 7.1% of the total GDP and approximately 49% of manufacturing GDP[4].

03

[3] "What India GDP growth rate forecast for 2018-19 means: Asit Ranjan Mishra" Livemint, https://www.livemint.com/Politics/zxNzYKQfLHUCB2yR3vKE8J/What-India-GDP-growth-rate-forecast-for-2018-19-means.html, accessed 20 May 2019

[4] SIAM. http://www.siamindia.com/cpage.aspx?mpgid=16&pgid1=17&pgidtrail=76

As a major employment generator, the industry employs around 32 million people directly and indirectly. The industry is estimated to contribute 12% to the country's GDP over the coming decade[5]. The industry will need expansion of the domestic consumption base, high value manufacturing competitiveness and technological capabilities to drive to the next level of growth.

India is one of the world's largest and fastest growing automobile markets, with annual sales of 26.3 million vehicles and production of 30.9 million vehicles in FY19[6]. India is also the world's largest tractor, two-wheeler and three-wheeler manufacturer, the fourth largest passenger vehicle manufacturer and the seventh largest commercial vehicle manufacturer.

The auto industry has significant growth potential owing to the country's low passenger vehicle penetration. Vehicle penetration is estimated at 22 passenger cars per 1,000 people in 2018 and expected to reach 72 vehicles per 1000 people by 2026, clearly establishing a strong upside potential[7].

India exported 4.6 million vehicles globally in FY19[8]. Two-wheeler accounted for 71% of Indian vehicle exports in FY19, followed by passenger vehicles (15%) . In FY19 passenger vehicles exports declined by 9.5%[10] (year-on-year), largely due to decline in exports to Indonesia (restricted imports to reduce trade deficit) and Sri Lanka (growth in used cars market impacted new car sales) along with the strategic decision of the OEMs to focus on domestic market than exports. However, with increasing manufacturing prowess, vehicle exports could play a significant role in India's future manufacturing growth.

3.1. Skill gap in the sector

A skilled and flexible workforce is at the foundation of a sector's capacity to attract investment, participation in global value chains and sustaining growth and competitiveness. Ensuring an adequate supply of skilled manpower and supporting skills development are thus key to increasing employment. Drawing from the aforesaid arguments, it becomes pertinent to invest in skilling and educating, to enable workers with the right skills to be job ready.

The employment in the automotive industry can be dichotomized into two segments:

- The employment in the manufacturing and R&D segment: This is in direct proportion to the number of vehicles estimated to be sold. The projected sale of vehicles directly propels the demand for human resource in the segment. Further, the change in the customer preference for vehicles will have direct impact on the changing skills requirement.
    - For example, the rising demand for smart vehicles will directly translate into a higher demand for work force with skills in electronics and IT. Similarly, the upcoming trend of electric vehicles will bring with it an exponential demand for electric engineers in the manufacturing segment.
- The employment in the dealership sales and service segment and road transport segment – this is in direct proportion to the number of vehicles in the market. The number and nature of vehicles sold, impact the resource requirement for the sales function, vehicles in the market translate into demand for services, thus leading to employment.

Considering the rapid transformations, the sector is facing many structural changes, making the skill gap assessment quintessential. ASDC and the automotive industry strongly believes that addressing skill gap is necessary to ensure the growth and competitiveness of the sector. The transformation being witnessed in the sector, has highlighted the need for manpower with a different mix of skillsets and an urgent requirement for upgradation of current skill levels of the existing workforce. The upcoming wave of automation and Industry 4.0 technologies entail a shift towards the skill sets that are technically advanced and knowledge intensive. Improved skills of the workforce could bring major benefits to the automotive sector, especially in addressing the challenges of regional labor market performance and productivity.

[5] "Auto sector may contribute 12 per cent to India's GDP in next decade: Anant Geete," ETAuto, https://economictimes.indiatimes.com/industry/auto-sector-may-contribute-12-per-cent-to-indias-gdp-in-next-decade-anant-geete/articleshow/58736673.cms, accessed 10 April 2019

[6] SIAM Flash report March 2019

[7] "Automobile- India becomes the world's 4th largest vehicle market," InvestIndia, https://www.investindia.gov.in/sector/automobile, accessed 10 April 2019 Indian Auto Export Analysis 2018:

[8] Minus passenger vehicles, all other segments move northward. https://auto.economictimes.indiatimes.com/news/industry/indian-auto-export-analysis-2018-minus-passenger-vehicles-all-segments-move-northward/67687266

[9] SIAM Flash report March 2019

[10] ibid

The *"Human Resource and Skill Requirements in the Auto and Auto Components Sector (2013-17, 2017-22)*[11] *"* published by National Skill Development Corporation in 2012 suggests that substantial skill gaps in the sector are hampering the labor productivity. At the aggregate level, skill mismatch has negatively impacted labor productivity through inefficient allocation of resources, making it more difficult for sector players to attract skilled labor.

The automotive sector being one of the flag bearers of growth amongst the manufacturing sector in India, the availability of a skilled workforce is especially critical given its potential to expand. Further, as the sector expands, entry of more global players would be seen, leading to increased need for skilled workforce, benchmarked to international standards.

Based on the above scenario, it can be concluded that the sector needs to improve upon its capability to forecast, anticipate and match skills gaps, while enabling the labor market, through efficient skill development and education policies.

For example, certain factors that will make a definitive impact on the skills includes:

- Advanced manufacturing techniques will have a significant impact on the work to be done by maintenance technicians.
- Lean systems require highly efficient materials planning, with a very close link between production and logistics. These developments will require skilled technicians who understand the new techniques and are skilled to utilize these advancements.
- The increase of electronics in traditional vehicles and emergence of electric vehicles will lead to a demand for new skills in electric technology and electronics.
- Paint technicians/motor vehicle painters will be required to have a greater understanding of the properties of materials used in vehicles due to the rising demand for lighter cars, electric cars, etc.
- The rise of cloud and control towers and their extensive use in supply chain tracking would require a material planning analyst to have an understanding of the advanced technologies in addition to their basic tracking functionality.

The existing skill gap studies lay down the foundation on which this study has been built upon, attempting to further elaborate on the enhanced skill requirements of the sector. The existing *"Human Resource and Skill Requirements in the Auto and Auto Components Sector (2013-17, 2017-22)*[12] *"* study, lists down the skill gaps in different sub-segments.

- Manufacturing sub segment to be mainly on following aspects:
  - Industry knowledge and technical knowledge pertaining to vehicles
  - Interpersonal skills, negotiation skills and multitasking skills
  - Skills for maintaining the required service levels and customer satisfaction levels
  - Process knowledge for customer service delivery cycle
  - Skills to handle sophisticated software for design, such as Pro-e, Catia, unigraphics, etc.
  - Programming skills for handling Computerized Numerical Controllers (CNCs)
  - Supply chain skillset to understand and apply concepts such as Kanban, Just In Time (JIT)
  - Skills set to improve production operations such as Total Productive Maintenance (TPM)
  - Dealer network development, product design skills, vendor development and management skills
- The auto component sub-segment the gaps are related to:
  - Inadequate understanding of advanced engineering drawings, system design, etc.
  - Low skill levels at entry-level operators
  - Inadequate training facility at auto component manufacturers
- The dealership sales and services sub-segment has gaps essentially related to technical, IT and soft skills:
  - Inability to assess the completeness of documents submitted my customers leading to delays in processing
  - Inadequate product knowledge to be able to effectively handle customer queries
  - Insufficient technical knowledge for vehicle service
  - Limited IT skills

[11] https://nsdcindia.org/sites/default/files/Auto-and-Auto-Components.pd

[12] ibid

The road transports segment is facing a major skill shortage of drivers. The main reason for the shortfall in the supply of drivers can be attributed to the jobs not being aspirational.

3.2. Government initiatives

The Indian Government recognizes the importance of the automobile industry. The Government's Automotive Mission Plan (AMP) 2016–26 envisions the industry to grow around four times by FY26, with sales volumes touching 66 million units, growing at a CAGR of around 10%[13]. To achieve this growth estimate, the auto industry will require additional investment of INR 4.5–5.5 trillion. The Government has taken several measures towards realizing the potential of the Indian automobile industry.

According to a recent report from Niti Aayog, successful implementation of government initiatives could help India realize EV sales penetration of 30% of private cars, 70% of commercial cars, 40% of buses and 80% of two and three-wheelers by 2030[14].

E-mobility has emerged as a top priority in the government's transportation strategy. In February 2019, the Government of India announced the FAME-II scheme with a fund allocation of INR100 billion (US$1.39 billion) for FY20-22[15] . It aims to provide impetus to the adoption of EVs and PHEVs by way of offering an upfront incentive on the purchase of vehicle and establishing necessary charging infrastructure.

Following the FAME II incentives announcements, the government has levied stringent eligibility criteria, basis the vehicle end-use, vehicle price cap, localization and product features which would restrict the incentives[16] for majority of the OEMs. Unlike FAME-I, FAME-II does not benefit the privately owned vehicles except for the two-wheelers. The government also announced a road map under the phased manufacturing program (PMP), entailing phased increase of basic custom duty on EVs, its inputs, parts and assemblies to promote indigenous development. Also, as per the guidelines released by DHI in April 2019, OEMs will have to indigenize a significant portion of components to avail the FAME-II incentives . DHI listed EV's assembly and components used across vehicle categories and charted the associated deadlines (during 2019 to 2021) as the effective timelines for indigenization.

The Ministry of Road Transport & Highway has relaxed homologation norms for OEM imports of up to 2,500 units of CBUs or CKDs of PVs or motorcycles, and up to 500 units of other categories annually, irrespective of their price and engine capacity[17]. This is a positive step for automakers as they can now experiment with multiple models to explore market acceptance, especially for niche / non-existent models and alternative drive train variants without being concerned about the homologation cost and time spent on certification. Successful experiments can then be adapted for localization.

The government announced a pan-India rollout of BSVI fuel by April 2020, with early introduction in Delhi (April 2018) and Delhi NCR (Oct 2019). However, the pan-India roll out plan is not in sync with the transition as industry needs the fuel at least three months in advance, i.e., by December 2019 to manage the transition. OEMs have ensured their production is in line with the BS-VI norms, however, non-availability of low-sulphur BS VI fuel will seriously jeopardize the transition to the new BS VI regime[18].

The Ministry of Road Transport & Highways has mandated multiple vehicular standards across segments, besides strengthening the Motor Vehicles Act through uniform driver licensing system, protection of children and vulnerable road users and rationalizing penalties. The Bill also proposes to introduce digitization in the monitoring and enforcement of traffic laws[19].

[13] AMP 2016–26, SIAM

[14] India could achieve high penetration of EV by 2030: Niti Report. https://economictimes.indiatimes.com/industry/auto/auto-news/india-could-achieve-high-penetration-of-ev-by-2030-niti-report/articleshow/68744211.cms?from=mdr

[15] Gazette Notification for FAME India Scheme Phase-II. https://www.fame-india.gov.in/WriteReadData/userfiles/file/FAME-II%20Notification.pdf

[16] ibid

[17] "Indian Government To Ease Import Regulations For Premium Cars, Motorcycles And EVs," NDTV, https://auto.ndtv.com/news/indian-Government-to-ease-import-regulations-for-premium-cars-motorcycles-and-evs-1864005, accessed 02 April 2019

[18] "Here's why the shift to BS-VI entails more than what meets the eye," Moneycontrol, https://www.moneycontrol.com/news/technology/auto/heres-why-the-shift-to-bs-vi-entails-more-than-what-meets-the-eye-3668421.html, accessed 17th May 2019

[19] Making our roads safe," The Hindu, http://www.thehindu.com/opinion/op-ed/making-our-roads-safe/article22500313.ece, accessed 30 January 2018

3.3. Electric vechieles and the future of mobilty

The global automobile industry is undergoing a significant transformation. The industry is likely to witness more changes in the next five years than it has in the last 20 years. Accelerating technological changes together with changes in consumer choices and preference can result in an industry structure that may be very different from the current one. The industry is at a major cross-road, as the future of mobility would be impacted by:

01 Electric vehicles

02 Connected vehicles

03 Autonomous driving

04 Shared mobility

The auto industry is undergoing a significant technological change on the back of multiple disruptive forces. Besides increasing technological maturity (autonomous, connected) and emergence of sharing economy, the need for environmental protection has been a key driver in the Indian perspective. In this context, the need for reduced vehicular pollution is creating a push for greater electrification and consequent charging infrastructure, alternative fuels and policy initiative on CO2 emissions.

The future of mobility is electric cars. While there has been a lot of deliberation and action initiated around promoting EVs, it has not translated into impactful penetration for electric vehicles. High cost of batteries, unavailability of compelling EV models, sparse charging infrastructure and lack of long-term policy roadmap on incentives have been some of the reasons for very limited off take of electric vehicles in India.

The National Electric Mobility Mission Plan and schemes such as FAME are very positive initiatives and convey the Government's intent to promote EVs. The recently launched FAME II scheme, is a welcome move. However, it levies stringent eligibility criteria which excludes majority of EV OEMs.

Future direction of mobility provides unique challenges. Industry needs to invest in new technologies while also deepening expertise in the existing technologies to improve efficiency and reduce emissions. It is therefore

important that India evaluates and frames commensurate policy choices (GST rates, EV policy, etc.) that incentivize innovation and adoption of advanced technologies. Along with this, a huge focus on creating a robust supply of skilled manpower to enable adoption of future technologies is imperative.

The Indian automotive industry is witnessing a transformation driven by changing consumer preferences and emergence of new technologies altering the structure of the industry. The response of the Indian automotive sector councils – Society of Indian Automobile Manufacturers (SIAM), Automotive Component Manufacturers Association

of India (ACMA), Federation of Automobile Dealers Associations (FADA) and Automotive Skills Development Council (ASDC) – has been to develop a comprehensive strategy to maintain the competitiveness and sustainability of the Indian automotive sector in the wake of various transformations impacting the sector. This strategy includes commissioning studies on the current employment supply and demand situation of the automotive sector, analyzing gaps in skill development and making policy recommendations to charter a path for harnessing the growth potential of the emerging technologies.

This study is a step in this direction to anticipate the need for skills in the different sub-sectors of automotive sector more effectively and to achieve a better match between skills and labour market needs. EY has adopted a participatory approach towards assessing the skill gap in the automotive sector through interacting with key stakeholders in the form of interviews. The study uses a pragmatic blend of primary data collection from industry executives, rigorous quantitative analysis and secondary research to meet the objectives of the study.

Indian automotive sector: An overview

The Indian automobile sector has witnessed a healthy growth phase. India is the fourth largest automobile market in the world with approximately 28 million vehicles sold every year[20]. It is poised to emerge as the third largest global automobile market by the year 2021[21]. Contributing approximately 7.1%[22] to the GDP, the sector employs a total of 32 million direct and indirect workers, as of 2018[23].

04

[20] http://www.forbesindia.com/article/special/whats-going-on-with-indias-automobile-sector/53527/

[21] https://www.autocarpro.in/news-national/india-set-to-surpass-japan-as-world's-no-3-auto-market-by-2021-40439

[22] http://www.siamindia.com/economic-afairs.aspx?mpgid=16&pgid1=22&pgidtrail=23

[23] https://www.thehindubusinessline.com/economy/by-2026-indias-automobile-sector-must-contribute-12-of-gdp-maruti-chief/article9354042.ece

Owing to the growing middle class and a young population, the sector is dominated by the two-wheeler segment, which comprises 80% of domestic automobile sales[24]. India is also a prominent auto exporter with exports growing at 15.54% in 2019 and an expected CAGR of 3.05% during the years up to 2026[25].

The automotive sector in India, 2018

Vehicle production

Global production ranking						Sector composition					Automobiles produced				
Rank	1	4	7	1	1	**% Share**	81%	13%	3%	3%	**Production**	24.5	4	1.1	1.2
Categ	2WE	PV	CV	3WE	Tractor	**Categ**	2WE	PV	CV	3WE	**Categ**	2WE	PV	CV	3WE
						Segement-wise domestic market share in FY 18					Total production: 30.9 million (in millions)				

Employement	Market size and Investment	
▶ **32 million** employed strong workforce employed by the sector	Automotive sector accounts for: ▶ **7.1%** of India ▶ **49%** of manufacturing GDP ▶ **26%** of industrial GDP	▶ **USD 20.8 billion** of FDI received between April 2000 - December 2018

Source: EY Analysis

4.1. Automotive sector value chain

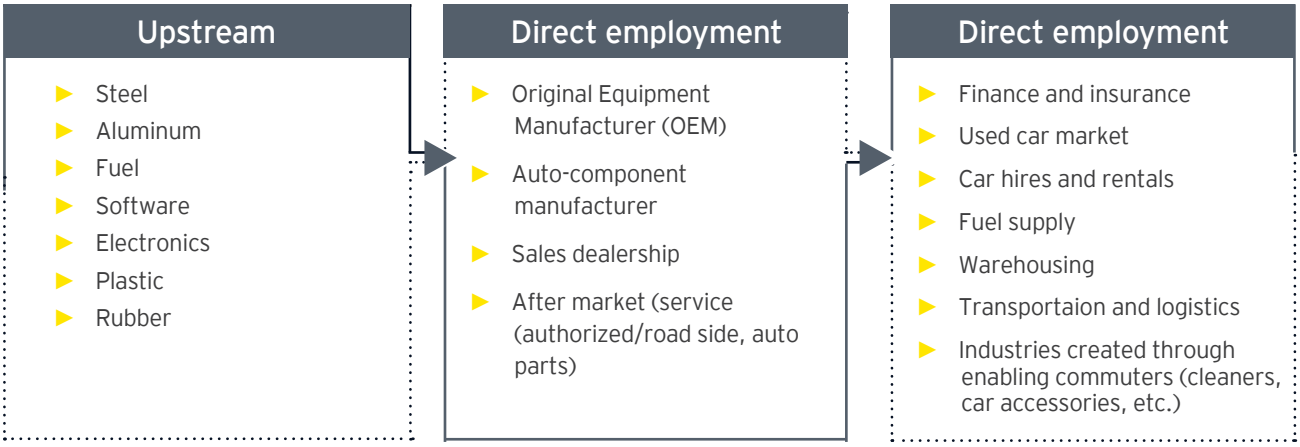
Automotive sector supports various business segments both in its upstream and downstream value chain. Every vehicle produced in the industry creates forward and backward employment linkages in associated industries. The automotive value chain is depicted as below:

- **Upstream:** The upstream comprises of industries providing raw material and services to vehicle and component manufacturers
- **Direct employment:** this includes companies that are directly involved in the manufacturing of vehicle and its components, vehicles sales and service
- **Downstream:** The downstream comprises of industries that are involved post-production and sales of vehicles

[24] Indian Automotive Industry. IBEF. https://www.ibef.org/download/Automobiles-January-2018.pdf

[25] ibid

Figure 2: Automotive value chain



Source: EY Analysis

This study focuses on the analysis of skill gap in the following segment of the value chain:

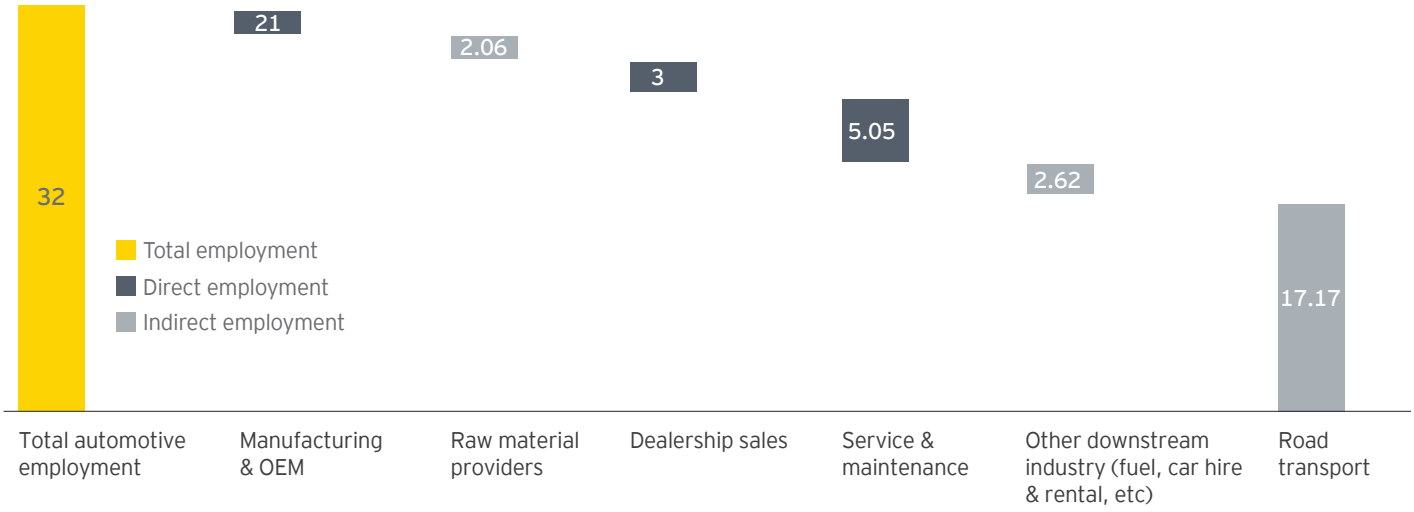
- **Manufacturing and R&D:** This segment comprises of OEM and Auto component manufacturers
  - OEMs are focused on designing vehicle, promoting vehicular mobility solutions.
  - Auto component manufacturers primarily includes manufacturers of automobile components or parts required in manufacturing automobiles. This sub-sector is primarily divided into four segments tier 1, tier 2, tier 3 and tier 4.
    - Tier 1 suppliers are companies that supply parts or systems directly to OEMs.
    - Many firms supply parts that are used in cars, even though these firms themselves do not sell directly to OEMs. These firms are referred to as tier 2 suppliers.
    - Tier 3 and tier 4 refers to suppliers of raw, or close-to-raw materials, like metal or plastic. OEMs, tier 1 and tier 2 companies all need raw materials, so the tier 3's supply all levels. Tier 3 and tier 4 are part of the upstream value chain.
- **Dealership sales** are local vehicle distribution channels, owned and operated as individual businesses. These sales outlets are authorized by OEM vehicle manufacturers to sell new or used vehicles. This sub sector of the automobile industry also looks at vehicle finance and insurance.
- **Dealership services** are locally owned businesses comprising of OEM authorized service center and road side garages. These setups provide vehicle service, tune-xups, scheduled maintenance and repair of vehicles. The sub-sector is also involved with the sales of automobile spare parts and process of warranty claims.
- **Road transport** segment comprises of transport and logistics, fuel outlets, two-wheeler ecommerce delivery agents, chauffer/taxi drivers, commercial vehicle operators.

4.2. Direct and indirect employment distribution

According to Department of Heavy Industry (DHI) the automotive industry employed more than 32 million people both directly and indirectly[26].

Direct employment: Includes personnel working with automobile manufacturers (OEM) and auto component manufacturers.
In-direct employment: Personnel working in the upstream and downstream industries.

Figure 3: Employment distribution in the Indian automotive industry. Employment in million.



Source: EY Analysis on industrial data

4.3. Disruptive industry trends

But will the 65 million be skilled enough to support Industry 4.0, automation and new technologies like electric vehicles?

The projected 65 million jobs by 2026[26] include both direct and indirect jobs . However, given the movement of the automotive industry towards higher involvement of technology and new concepts like electric vehicles (with lesser number of moving parts and lesser need for maintenance), the number of routine and unskilled jobs are slated to reduce. Automation and Industry 4.0 demand new skill sets, which the current training facilities might not be ready to dispense, or the candidates may not possess the threshold qualifications for these skill sets. In the future, current skills that may become obsolete, will lead to: (a) Endangering of jobs; (b) Development of new skills leading to the fulfilment of new evolved job requirements, thus continuing the old job, or take up a new job.

[26] https://dhi.nic.in/writereaddata/DHI_2017-18_annual_report/files/basic-html/page48.html

[27] EY Analysis

Figure 4: Disruptive trends in the industry

Source: EY Analysis

With Industry 4.0 disruption, industry trends stand to impact different sections of the sector differently. These trends which form the bedrock of this study can be categorized into the following three segments:

a) Manufacturing trends:

- With the increase in the use of technology, automation, Industry 4.0 and electrification of vehicles, new methods of manufacturing will render routine jobs obsolete and will demand a higher degree of skill for emerging job roles.
- Electrification of vehicles brings about a new product class that requires less labor to build and maintain. There will be an increase in jobs due to new technology, need for speedy and large-scale adoption of the technology, skills to customize designs, etc.
- Bottom of the pyramid job roles requiring lower skill levels will be endangered.

b) Changing market demands:

- Customers are becoming more informed and demand a better class of services; this automatically increases the level or degree of skills required to dispense such service.
- Shift in customer preference from owning cars to shared mobility.
- Increase in the demand for omnichannel experience.
- Shift towards autonomous, connected and electric (ACE) cars raises the bar for the skill level of workforce.

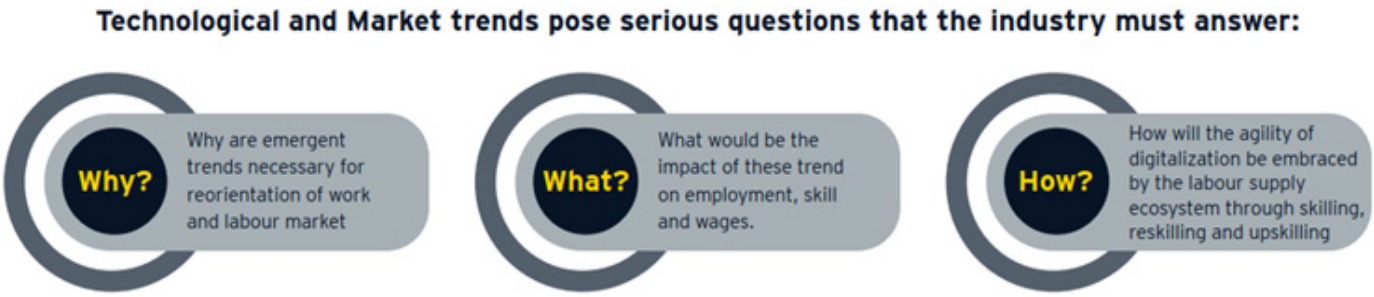
c) Government interventions:

- Relaxation of taxes would lead to boosting manufacturing.
- Policy initiatives towards facilitating exports and imports.
- R&D in the sector facilitated through government grants and R&D cost waivers.
- Directives such as emission norms and safety norms to create technology and skill challenges for the industry.

Approach and methodology

05

The fundamental questions which laid the foundation for the current study included:



Source: EY Analysis

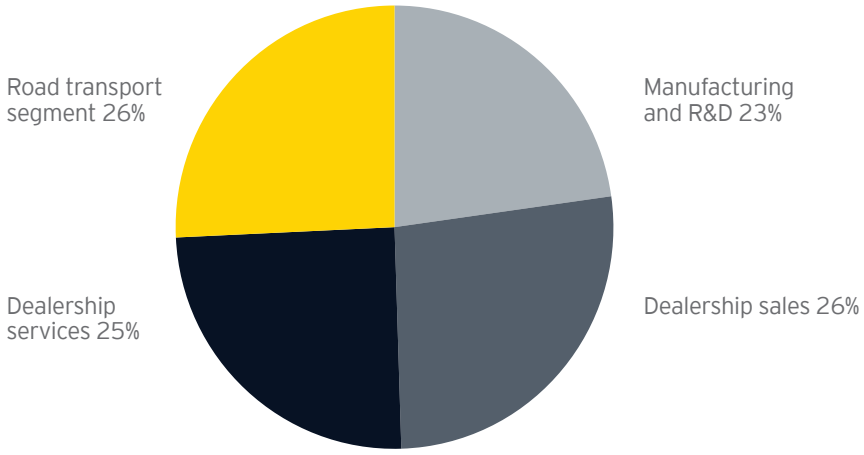
A thorough study and exploration of trends that are leading to disruption in the automotive sector, within the time till 2026 and their impact on the skill sets of the workforce in the industry was undertaken. The investigation encompassed extensive primary and secondary research. The insights generated about the envisaged skill gaps were based on the understanding developed through secondary research and a subsequent validation by experts of the industry, through primary interactions. The secondary research included perusal of data and reports on Industry 4.0 and other trends that have started to show their presence in the sector and how the dynamics of automotive sector is changing in terms of required skill sets, of the workforce.
A perspective was developed about the sector's situation by 2026, further strengthened by interactions with sector stakeholders who have an in-depth understanding of the disruptions and its impact on the employment.

During our primary research, we interacted with more than 100 business leaders, representatives of industry associations across the sub sectors.

5.1. Key question asked during primary interactions were:

- Which are the top job roles in your organization?
- Which are the jobs/skill sets that are expected to emerge/ disappear/reduce by 2026?
- What changes do you see in the business volume and in head count by 2026?
- What are the top sources of recruitment in your organization?
- What are the current employee qualifications and how are they expected to change by 2026?
- What is the career pathway for a blue-collar worker?
- What is the time frame for the trends to reflect significantly in your organization?
- How can the government intervene and improve the current situation?

5.2. The break-up of the respondents sub-sector wise is depicted below:

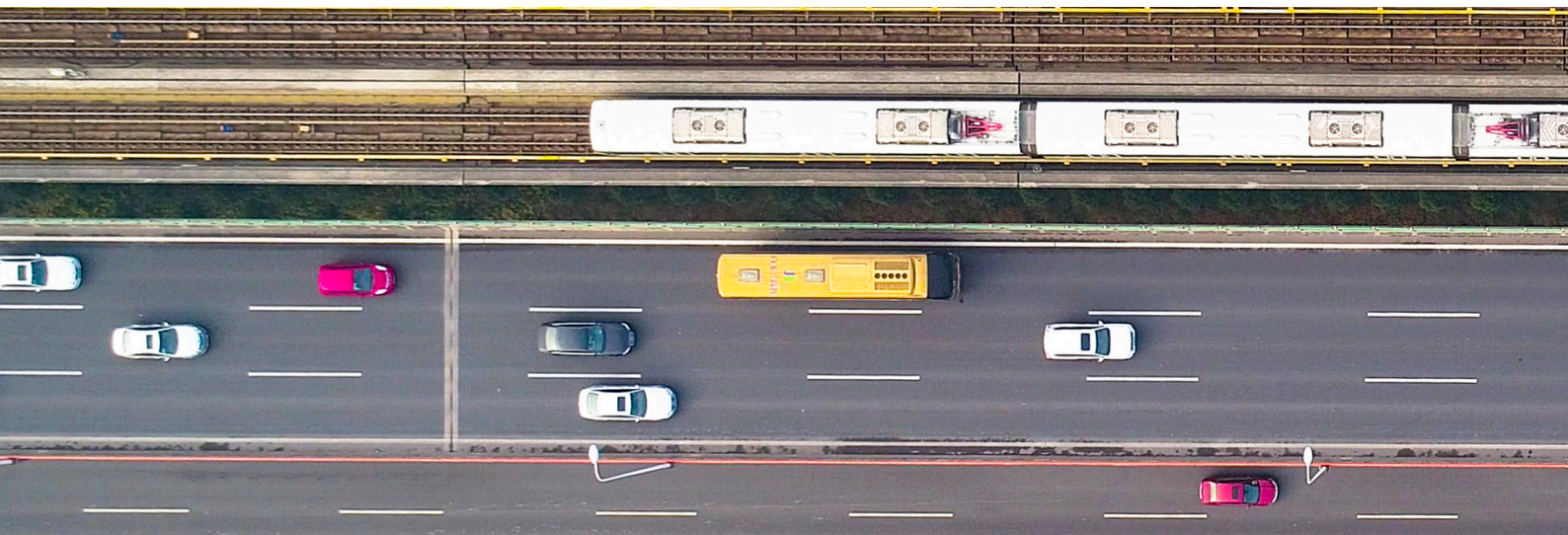


Source: EY Analysis

5.3. Methodology for employment projection

A pragmatic approach has been used to estimate the employment figures. The methods to estimate the employment figure for different sub-segments are different from each other because of the distinct sub-sector fundamentals. The methodology on human resource requirement estimation in this report has three fundamental approaches.

- Vehicle production: The human resource requirement for OEMs and sales dealership.
- Number of vehicles on road: Vehicle service and road transport sub-sector.
- However, the employment in OEMs, dealership sales and service and road transport are a function of vehicles demanded and on road, literature survey suggested that the employment in the auto component sub-sector is a function of the sub-sector's turnover. One of the possible reasons for this being apart from supplying to the domestic market, auto component manufactures account export as one the major stream of revenue. Thus, the domestic vehicle demand is just one of the facets of auto component business with exports forming the other one.



The detailed methodology for all the three fundamental approached is explained below:

Human resource requirement in OEMs and dealership

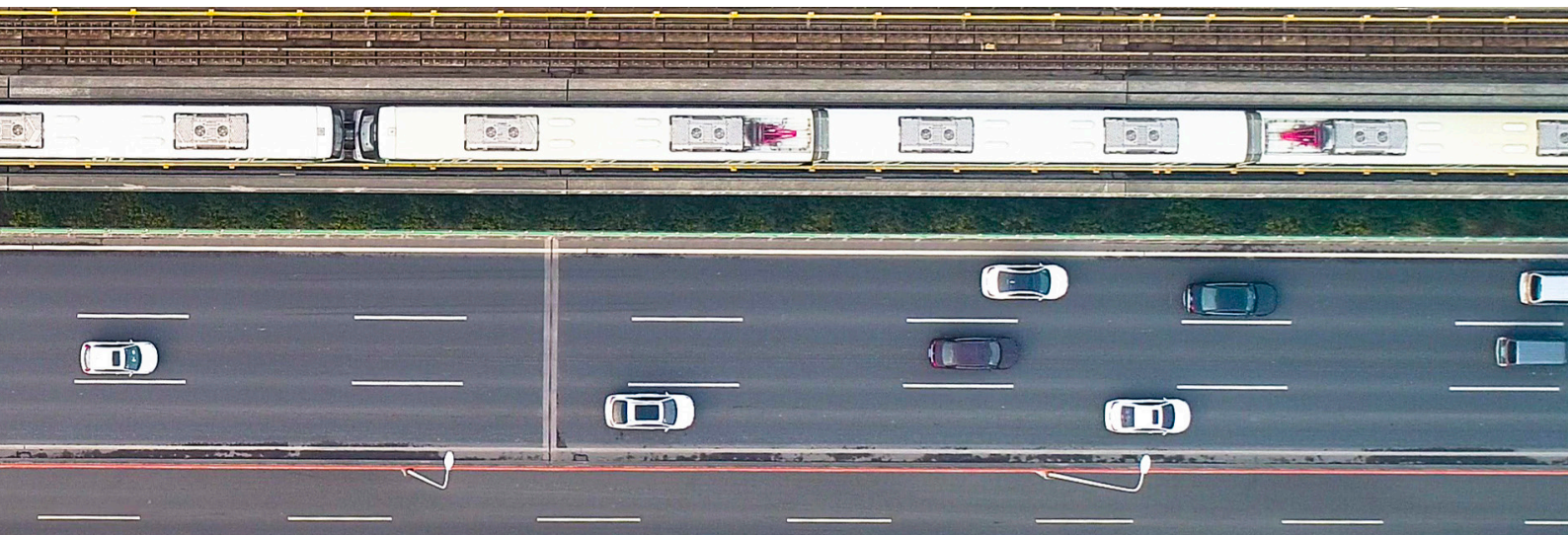
- The first step in estimating human resource requirement for OEMs and dealership was estimating the demand for vehicles. The demand for vehicles was estimated using regression analysis that recognized the statistical relationship between predictor variables and dependent variable (demand for vehicle). The broad categories of statistical techniques that can be used for forecasting vehicle demand are:
  - Multiple linear regression
  - Time series model
  - Simulation approach
- In this report multiple linear regression has been used for the vehicle demand projection.
- After the vehicle demand was estimated based on the regression equation, the current employment figures at OEMs were taken from CMIE database and the employment at dealerships was arrived from primary survey. Further, it was necessary to consider the productivity improvements that will be taking place in the sub-sector. Finally, using the current employment, productivity improvement ratio and per employee number of vehicles produced, the employement figures were arrived.

Human resource requirement in road transport and vehicle service

- The human resource requirement for road transport and vehicle service was estimated taking into account the number of vehicles on road. The number of vehicles on road between 2008 to 2018 was taken from SIAM considering the active life of vehicle to be 10 years. Further, the projected vehicles on road was dichotomised between vehicles serviced by authorised service centres and road side garages. The employment projection was done as the function of number of vehicles serviced per person.

Human resource requirement in auto component manufacturing

- The human resource requirement for auto component was estimated based on the annual turnover of the auto component manufacturers. The auto component annual turnover was forecasted between 2019 to 2026 for estimating the employment potential of the auto component sub-sector.



Sub-sector analysis

Sub-sector analysis: Manufacturing and R&D

The manufacturing and R&D sub-sector is one of the key segments of the automotive sector. It comprises of the Original Equipment Manufacturers (OEMs) and auto component manufacturers. 70% of firms in the sector are informal, leading to heterogeneity in the type of ownership, organisation, scale of operation, etc[28]

Being capital and knowledge intensive, the manufacturing and R&D sub-sector forms the foundation of the automotive sector and contributes significantly to the growth of indian manufacturing industry. It is one of the largest manufacturing industries in the country, contributing to 5.6% of the national GDP in 2016-17[29]. It is projected to contribute over 12% within the next decade, according to the Automotive Mission Plan, 2026[30] This segment is one of the few manufacturing sectors that has registered a healthy y-o-y growth.

This segment is one of the key employment generators in the sector due to forward and backward linkages with other key industries such as transportation and construction, leading to an employment multiplier effect.
With the advent of Industry 4.0 technologies, this segment is going to be majorly impacted . The impact of these technologies on the sub-sector will be in two aspects:

- Those that will be used on the shop floor to automate core manufacturing processes such as production
- Those that will provide supporting services to make the production system more efficient

Another, aspect that is expected to transform this sub-sector is the adoption of electric vehicles. The EV segment though growing rapidly, is still in its nascent stage in India. A primary barrier towards mass adoption of electric vehicles is the lack of reliable, accessible and affordable charging infrastructure.

06

[28] Paul, G. B., Jaganth, G., Abhishek, M. J., and Rahul, S.. "What Makes Enterprises in Auto Component Industry Perform? Emerging Role of Labour, Information Technology, and Knowledge Management." In Globalisation of Technology (2018): 253-283.
[29] Automobile sector's contribution to GDP. Press Information Bureau, Government of India, Ministry of Heavy Industries & Public Enterprises. (2017). http://pib.nic.in/newsite/PrintRelease.aspx?relid=169436
[30] ibid

6.1. Manufacturing and R&D: OEM

OEMs are the core of the automobile industry. All other sub-sectors of the industry are feeders to this sub-sector.

The automotive manufacturing

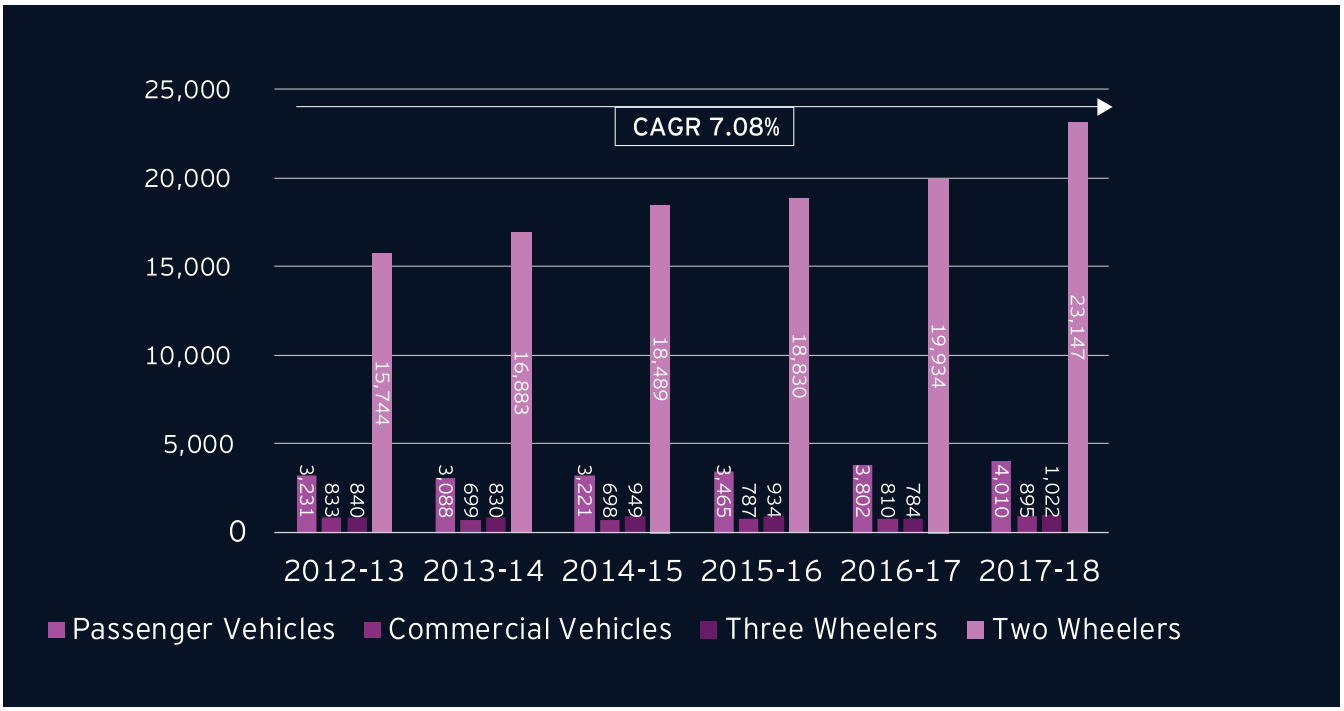
Employement	Market size and Investment				
▶ 9 Indian states manufacturing two wheelers ▶ 14 Indian states manufacturing passenger vehicles	Count of OEM vehicle manufactures working in India				
	Category	2WE	PV	CV	Tractor
	Number of OEMs	13	15	12	17
	Number of manufacturing units	22	29	34	20
▶ 7100 electric cars are on Indian roads ▶ 94% of electric vehicles are concentrated in Delhi and Bangalore	Count of electric vehicles sales				
	Segment	e-2-wheelers	e-rickshaw	e-2-wheelers	Total
	Sales FY2019	1,26,000	6,30,000	3,600	7,59,000
▶ 0.31 Million employed in 2018	Sector composition				
	% share	81%	13%	3%	3%
	Category	2 WE	PV	CV	3WE

Source: EY Analysis

Being a substantial contributor to the national GDP and the manufacturing GDP, the industry has a distinguished position globally as one of the largest producers of vehicles. Amongst the four sub-sectors within the automotive industry, foreign players form the largest OEMs. This has brought about rapid adoption of advanced technologies within the sub-sector and has pushed the domestic players to upgrade rapidly.

Post the industrial liberalization within the country, the Indian auto industry has witnessed the entry of several global players through technical tie-ups and minority investments. Consequently, the industry has also been witnessing investments from both global and domestic OEMs towards building and expanding manufacturing capacity.

Figure 5: Vehicle production trends



Source: SIAM

6.1.1. Embracing the future

Rapid technological updates, global launches of vehicles, environment friendly mindset of customers and constant regulatory changes have been the defining factors for this sector. Therefore, future competitiveness continues to remain dependent on how the industry responds to technological and global market trends. Our analysis reveals that OEMs within the country are slowly adopting emerging technologies, at a less than desirable pace. Our research indicates that 100% of the participating OEMs had started using Industrial Internet of Things (IIoT), while a smaller percentage use additive manufacturing and virtual reality for prototyping.

Amidst such a dynamic scenario of technological advancement in the sector, it is imperative that the workforce also aligns itself to this upgradation. The industry has been emphatic about the urgent need to train and upgrade the skill levels of the workforce.

As the sector is witnessing the new wave of exponential technologies, it becomes imperative for the sector players to deploy resources who are accustomed to implementing these technologies. However, the sector players have voiced their concern at the current level of skills among the automotive human resources to handle Industry 4.0 technologies. The lower levels of exposure of current human resources to Industry 4.0 technologies are being viewed as the biggest impediment towards the adoption of efficiency improving technologies among OEMs. A different skill-set aligned to Industry 4.0 technologies for the sector and a core attribute of discipline towards work are the most urgent requirements that the training needs to focus on.

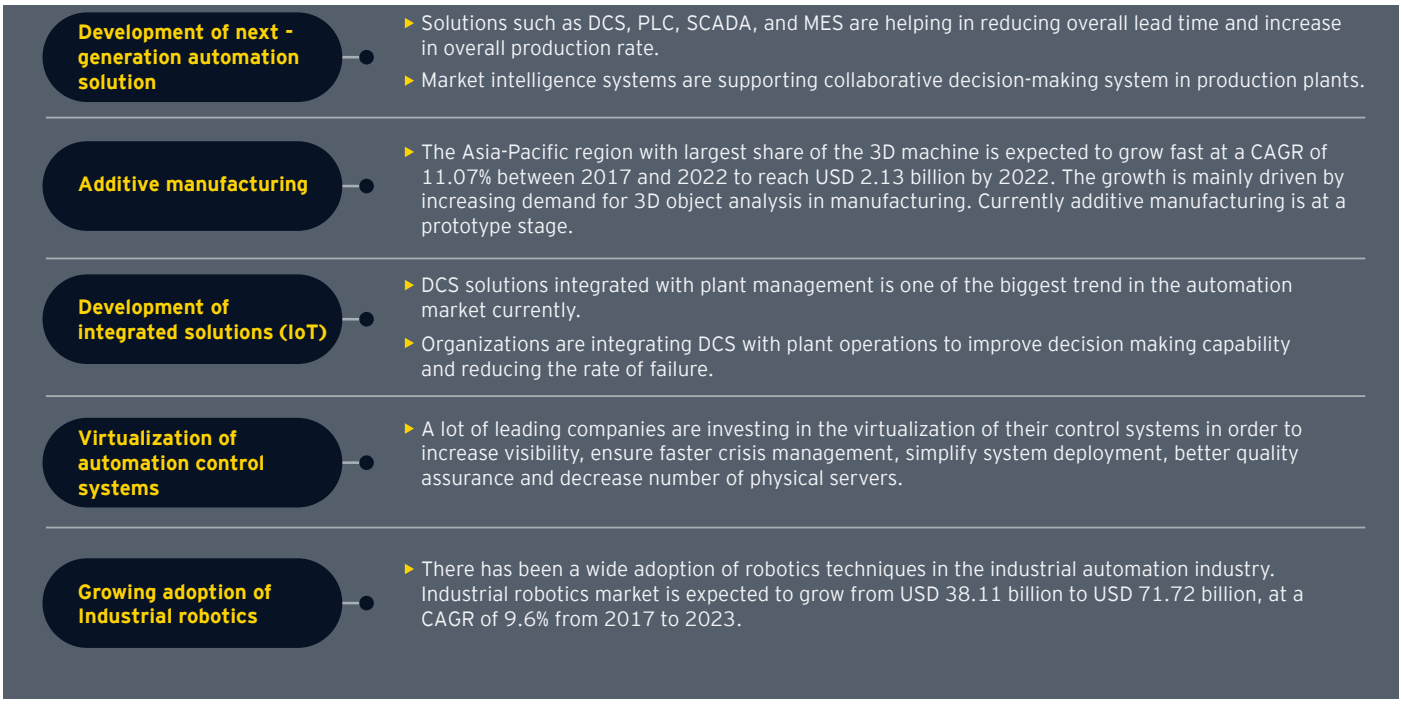
The absence of adequacy in the quality of the workforce that OEMs hire, most have set up their own in-house facilities to train workforce. Traditionally, the shop floor has witnessed a skew in gender mix, which continues to be the trend till current times.

However, OEMs are very keenly looking towards bringing about gender diversity on the shop floor. Given the widespread use of automation and computer-controlled processes for manufacturing, the conditions are highly favourable to bring about this change. Therefore, training also needs to focus on enhancing inclusion.
The same trends also demand a change in the skill structure of the work force feeding the OEMs.

6.1.2. Sub-sector trends

To be able to forecast jobs for the sector, both on quantitative and qualitative parameters, it is imperative to understand the trends that will define the requirements.

I. Manufacturing trends



Source: EY Analysis

a) Industry 4.0

Industry 4.0 is a broad term used to refer to several emerging technologies that have application across sectors including the manufacturing world. Its impact on the automotive industry has led to many disruptions in processes and products, spanning the entire value chain.

A collective reference to the use of cyber-physical systems, IIoT, robotics cloud computing and cognitive computing defines Industry 4.0. Commonly known as the fourth industrial revolution, it has led to the idea of smart factories, that use automation and data exchange in manufacturing technologies. It allows for decentralized decision making by creating a virtual copy of the physical world. Consequently, real-time analysis, decision making and communication are possible between humans and machines.
In terms of the automotive industry, Industry 4.0 could lead to an increase in newer product variants, better efficiencies, enhanced quality, shorter technology cycles, better human resource efficiency and a reduction in time to market. OEMs have led the adoption of Industry 4.0 within the automobile sector. One of the biggest two wheeler manufacturer is currently using 100-200[31] Cobots or collaborative robots in its factories. Another leading passenger vehicle manufacturer uses 1,700 robots in its seven process shops and five assembly lines. As a whole, the Indian automotive industry has accepted the idea of connecting machines.

Despite these numbers, the adoption percentage is far from the desirable. One of the reasons for this delay is that the Indian automotive workforce is not adequately prepared to handle a higher degree of automation or greater use of robots. This can be attributed largely to the lack of skilled manpower for handling such automation. A major percentage of workers, essentially the blue-collar workforce has a basic shortfall in handling computer-based machines, tools and processes. The problem gets compounded with a lesser threshold of English language capability amongst the workforce, limiting their options of being trained on

[31] https://economictimes.indiatimes.com/robots-at-the-wheel-machines-increasingly-replacing-manual-workers-in-auto-plants-in-india/articleshow/49990001.cms?from=mdr

globally available content. Though it is widely acknowledged both within the industry and the worker community that immediate skill upgradation is the need of the hour and only that can keep the workforce relevant, however the learning curve is fairly steep, making it a sub-optimum skill upgradation scenario. A widespread enhancement in the skilling of the workforce is the most urgent step to be taken, wherein the capacity for such training, needs to be created at ITIs, polytechnics, other vocational training institutions and within OEM organizations.

The key focus areas that need to be addressed through skill upgradation are:

- **Advanced robotics and automation:** Human-robot cooperation (HRC): Robots that are safe and conducive to use in proximity of human workers are being developed and deployed on the shop floor. For example, when working with heavy machinery, the robots are programmed to sense the position and movement of the human co-workers and can prevent a collision with them. This makes them safe to work alongside human beings. With an enhanced focus on occupational safety standards, OEMs and other manufacturers are keen to deploy such technology.
- **Artificial intelligence and machine learning:** Artificial intelligence and machine learning allow robots (or computer programs) to learn from their environment and adjust their programming accordingly. For example, a robot can learn from experience and detect wrinkles in the fabric of car seats or understand that a motor is not working the way it is supposed to. This would enhance quality and efficiency in various manufacturing processes. Therefore, the automobile industry is evaluating various applications of AI across functions. While this technology may impact a traditional job role, but at the same time introduce requirements of newer job roles.
- **Cloud computing and remote solutions:** Cloud computing and remote solutions provide the basic service of saving data on servers away from the actual installation. At a basic level, they protect data from damage from accidents, natural disasters and from being stolen in the process of corporate espionage. At a higher level, this remote data storage and access can allow the processing of this data through IT infrastructure that would be expensive for the automotive facility to maintain at its own premises. It opens the possibilities of collating data from multiple sources and analyzing it to devise strategies and predictions for better processing and collaborations between multiple facilities. Cloud computing also sets the base for several services that the modern automobile industry or manufacturing facility can make use of. This technology has application in a distributed manufacturing scenario, as it allows all services to be available in a pay per use or per period option and the use of infrastructure or machinery temporarily.
- **Industrial internet of things:** The internet of things speaks of the connection of every equipment with the internet, such that they can be monitored, remotely controlled and their measurements can be recorded and communicated through the internet. In case of the IIoT, a device-based access and control is used on assembly line equipment and robots, during the manufacturing processes. Through IIoT, the performance of the machines can be monitored for errors, the measurements they make can be used for analysis and future improvements and their movements can be controlled or modified remotely to initiate different programs. The data collected from such machines can also be collated and analyzed through big data programs, which specialize in analyzing large and complex data sets that normal statistics are unable to analyze easily. Owing to such capabilities, IIoT opens the possibility of real-time data processing and communication, using smart and real-time data sensors that are much more viable and effective for improved machine calibration performance.

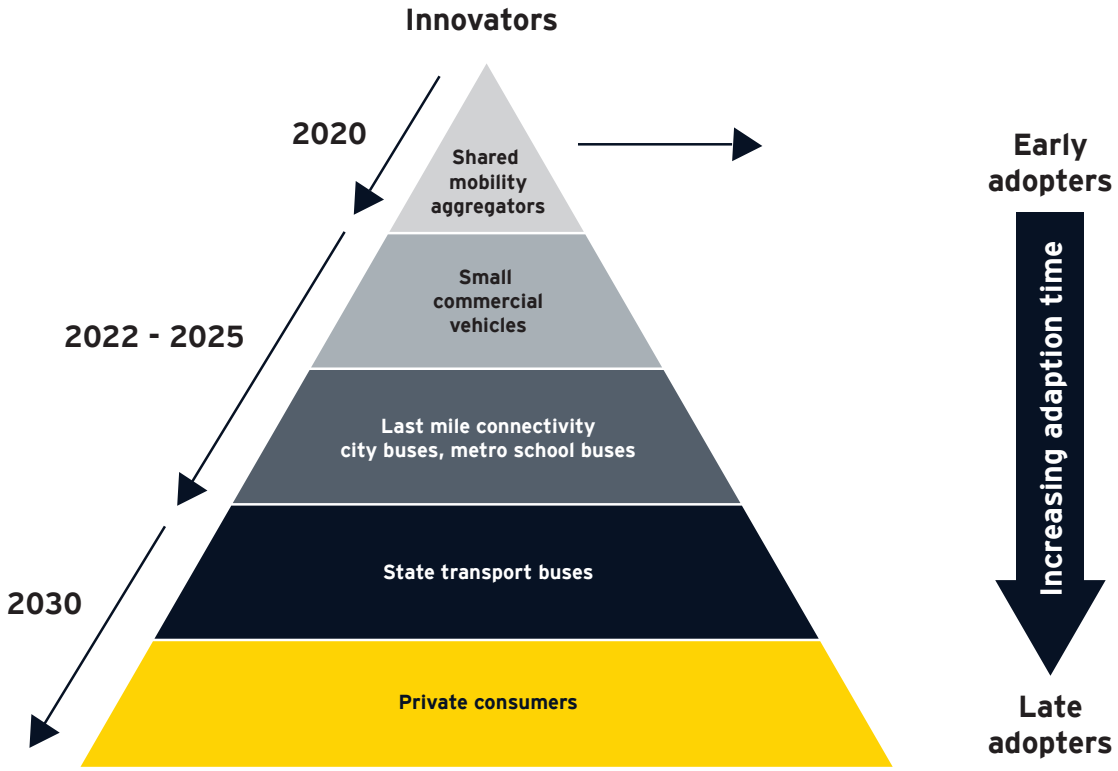
3D printing and digital fabrication mediums:
3D printing, also known as additive manufacturing (AM), refers to creating a three-dimensional object with successive layers of material being used under computer control to create an object. Objects can be of almost any shape or geometry and are produced using digital model data from a 3D model or another electronic data source. 3D printing allows rapid prototyping leading to shorter lead times in R&D processes. In the case of the automotive industry, 3D printing translates into an easier fabrication of lightweight car components, low-volume and high-customization parts, direct manufacturing of tools and improved production cycle times. In the modern automobile OEM, these processes will give rise to better automotive parts, higher customization options for customers, and shorter evolution times for automotive technology.

- **Electrification of vehicles:** It is pertinent to understand the key elements of this technology that will bring about a directional change for the sector in general and on OEMs as a subsector. Electric vehicle technology is slated to be the harbinger of decline of ICE.

a) Trends on the adoption of EVs:

- The adoption of EVs initially is expected to begin with shared mobility aggregators. The motivation for this segment is a reduced cost per km, leading to a reduced running cost and better margins.
- The next segment to adopt EVs would be small commercial vehicles, which will also benefit from the low running costs.
- Electric rickshaws, school buses and city buses used for last mile connectivity will be the next segment moving towards adopting EVs. This is a trend which is already being witnessed in small pockets. The last two segments to adopt EVs would be state transport buses and private consumers.
- Responding to this huge change in the market, most Indian automotive OEMs have already begun investing in R&D and initiated steps towards EV production schedules

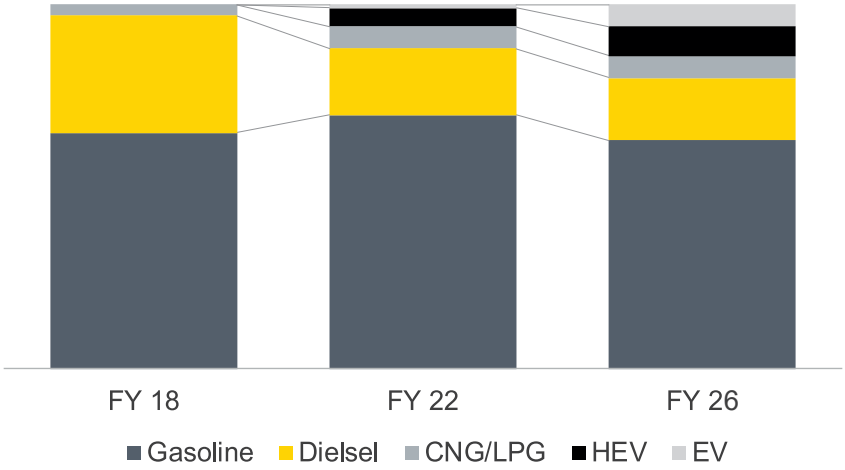
Figure 6: Responses by the adopters



Source: EY analysis

There are various estimations about the pattern and pace of adoption of electric vehicles, however, our analysis of various factors and regulations have brought about the following indicative map.

Figure 7: Effect of change in government norms on percentage of vehicles in the market.



Source: EY analysis

- A consistent drop in the number of petrol and diesel vehicles will be seen over the next few years and a corresponding increase in the electric, hybrid and CNG/LPG vehicles is a definitive trend. The EV market share shall witness a steady growth over the medium to long term.
- Given that the technology is still not fully developed, ICEs would continue to be the dominant powertrain till 2026. It is safe to assume that till the inflection point for EVs dominance occurs, ICE technology will continue to develop and improve in terms of fuel efficiency. However, EVs are likely to gain a significant market share by 2030[32] .
- This forecast is in line with the government impetus on green technology. There have been far-reaching regulations that have steered the direction of automobile sector towards EVs.

The above policy trends will be accompanied by a shift in the job mix for automobile companies. The more routine jobs will be replaced by highly specialized jobs in designing and programming. The new skills required will be less dependent on muscle memory and more on handling computers, sensors, batteries and wires. It is also envisaged that EVs will also evolve over time, thereby requiring electronic designers and fabricators to modify and develop the technology further.

Along with some new job roles that will come into being, some job roles, essentially centered around ICE technology, may become redundant or obsolete. Therefore, it is imperative that workforce upskills itself to stay relevant.

With the advent of such technologies, traditional manufacturing scenarios will undergo a shakeup and consequently the workforce deployed may become redundant. However, designing and developing such technology applications, deploying them and using them will require a new genre of workforce, with a different skillset and profile.

II. Changing market trends

With a huge focus of small car exports, India has become a hub for small car manufacturing. This has been aided by availability of adequate numbers and cheaper labor cost. Indian OEMs have already undertaken exports of cars to new markets in Latin America, the Middle East, Australia and Africa. Therefore, this business trend provides specific inputs about the dimensioning, profile and skillset of the workforce required.

a) Increased investments by domestic and foreign players: Domestic and foreign OEMs have lined up investments of almost US$10 billion over the next few years. The sector has attracted US$18.411 billion in FDI between

[32] EY Analysis

April 2000 and December 2017, accounting for 5% of total FDI inflows. This endorses the growth potential of the sector, making it an attractive option for job creation.

b) Decline in diesel sale and regulatory push towards alternative fuel vehicles: Global warming and depleting natural resources are driving investments towards manufacturing of small, fuel efficient and environment-friendly vehicles. In 2013, the Government of India unveiled the National Electric Mobility Mission Plan to promote sales of alternative fuel vehicles. This scenario provides a specific map for the kind of workforce required in the future, with definitive focus on electric vehicles.

c) Emphasis on rural markets: There is a renewed effort by OEMs to strengthen their rural network given that the next phase of sales growth is likely to come from those areas. With the rising economic status of the middle class, rural markets are poised to become high growth avenues. Therefore, future job requirement will include rural and semi-urban locations. This is a favorable trend as it reverses the trend of migration for jobs.

d) Increased demand for vehicles with ACE features: The trend of automated, connected and electric (ACE) vehicles is already being seen in the market, across products and variants. It is increasingly finding favor amongst the customers. Additionally, government's impetus through regulatory reforms on emission and safety norms, is leading the OEMs to respond to these requirements. Therefore, evolved skillsets amongst workforce, are required on an urgent basis.

e) Growth of luxury cars: In 2017, luxury cars sales in India grew by nearly 17% year on year. The luxury car market in India is expected to grow at the rate of 25% CAGR during the period 2017-2020. This creates an additional requirement of workforce to match the growing manufacturing requirements for the segment.

III. Government interventions: Regulatory environment

The government has been playing a very active role for the automobile sector. By way of many policy initiatives, the government has created a big boost for the sector. Overall, manufacturing and investment friendly policies have created a conducive environment for the growth of the sector. However in 2019, changes in the tax system, regulation on emission and safety, have brought about some dampening of the sector, which is likely to be a short-term phenomenon.

a) National Manufacturing Policy: The policy aims to boost the contribution of the automobile industry to the GDP, setting a goal of increasing it from 16% (2016) to 25% (by the year 2025). To support this, the policy aims to create 100 million additional jobs by the year 2025. While automation may appear to somewhat challenge this goal of additional job creation, the many new avenues of changing jobs and introduction of technology supported roles, makes this goal appear feasible.

b) Automation Systems Technology Center (ASTeC): To bring the government's mandate of 100 million additional jobs to fruition, it becomes important to simultaneously develop the technology that will support this mandate. The department of Electronics and Information Technology (DEITY) has initiated the ASTeC program to provide national leadership in the field of automation, with 11 technology projects having been initiated under ASTeC in areas such as control, perception, and systems. This will enable prospective job entrant to get skilled on these critical projects.

c) Automotive Mission Plan 2016-2026: To achieve the goals set in AMP, the mission plan has outlined a number of interim steps, some of which are:

- The automotive industry to grow by 3.5 to 4 times the current value of US$74 billion to US$ 260-300 billion.
- By 2026, aim to increase passenger vehicles to 9.4-13.4 million units, commercial vehicles to 2-3.9 million units, two wheelers to grow to 50.6-55.5 million and tractors to grow to 1.5-1.7 million units.
- Raise the automobile industry's GDP contribution to over 12% and generate 65 million additional jobs, increase exports to reach 35-40 % of overall output and grow auto component industry from INR 593,500 crore to INR 732,000 crore.
- The mission envisages an End of Life policy for passenger vehicles, similar to the existing policy for commercial vehicles, leading to a higher number of life-ended scrapped vehicles, leading to further purchase of new vehicles, increased safety and less pollution.
- The direction provided by AMP creates a definitive charter for job creation through enhanced manufacturing, safety, technology and environmentally friendly features.

d) Regulation related to emission norms: The government mandated the move from Bharat Stage (IV) to Bharat Stage (VI) norms, creating a scramble amongst the automobile manufacturers aligning their production systems to these

new norms. This has led to added investments by OEMs. The industry felt that aligning production capabilities and manpower to new norms, within the timeframe proposed by the government, would be a challenge, leading to a transitionary adverse impact. Hence, OEMs have been voicing benefits about technology neutral approach, i.e., remain open to electric vehicles, hybrids, CNG, methanol and ethanol powered vehicles. The government has responded positively by way of a subsidy allocation of 2.6 billion towards FAME in FY19, an increased outlay from 2.3 billion in FY18, to support industrial development of hybrid vehicles and manufacturing ecosystem.

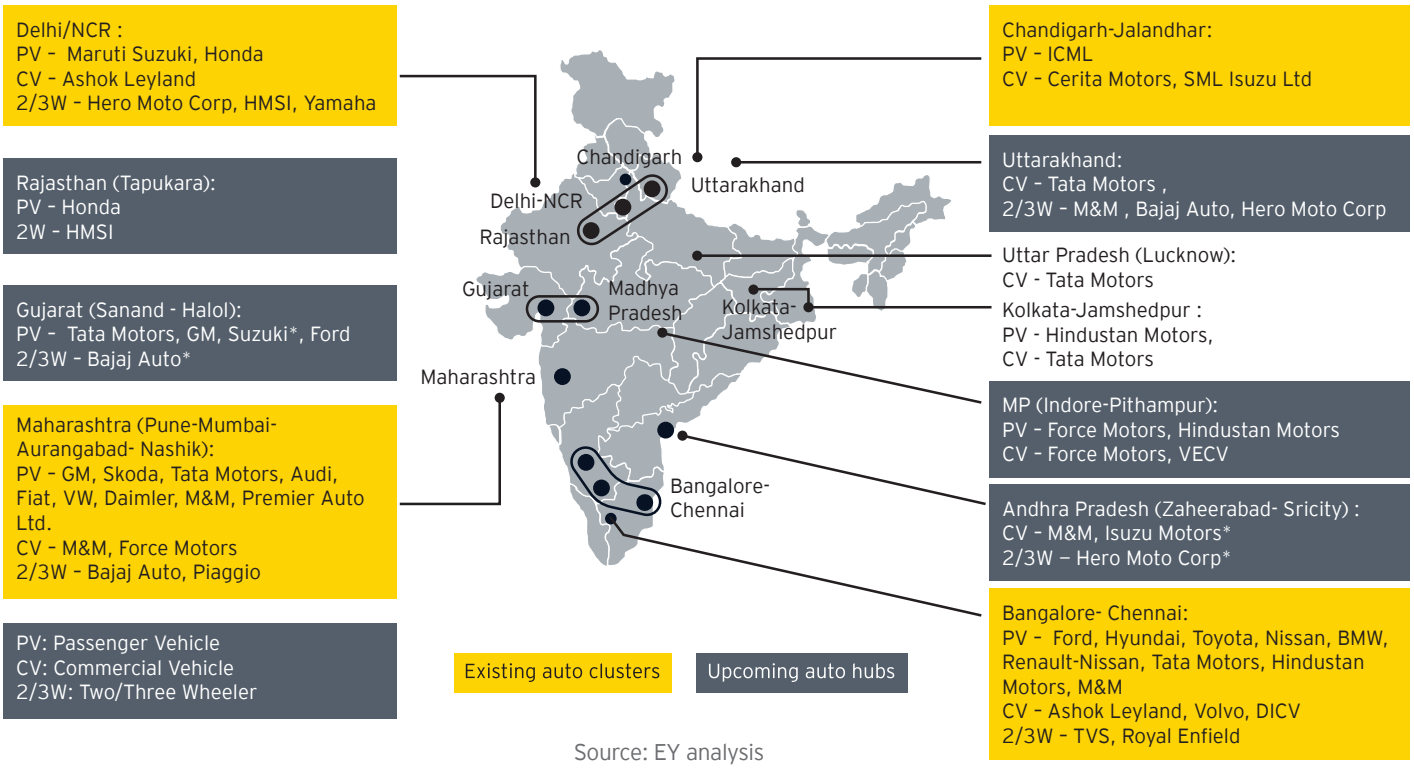
e) Safety norms: As with emission norms, safety norms also put research and manufacturing capabilities under pressure for OEMs. With all vehicles having to comply with Indian Standards (IS) and Automotive Industry Standards (AIS) for safety norms, the OEMs are aligning their capabilities to incorporate these requirements. The government has also come forward to support this change by way of forming the national automotive and R&D infrastructure project (NATRiP) for state-of-art testing, granting official approval and R&D infrastructure in India. Given the abovementioned regulatory changes mandated by the government, organizations have already invested and initiated realignment of production lines. However, no concrete steps have been taken to match the supply of skilled manpower to meet these needs. The deficit of requisite skillset is not being addressed by training providers or vocational training institutions, with the same urgency.

6.1.3. Demand analysis

6.1.3.1. Geographic location

OEM sub-sector, a key contributor to manufacturing GDP of the country has developed and grown across clusters. These geographical clusters have provided conducive ecosystem for OEMs. Following are the significant automobile manufacturing clusters, spread across the country:

Figure 8: Automobile manufacturing clusters



Source: EY analysis

6.1.3.2. Workforce distribution based on functions

Table 4: OEM workforce distribution

Major function	Sub-function	Percentage of workforce deployed (2018)
Manufacturing	Assembly	50%
	Paint	5%
	Welding	10%
	Press shop	10%
	Logistics	15%
	Maintenance	5%
	Total manufacturing	95%
Purchase & Product Design	Design	2%
Commercial function	Finance	1%
	Legal	
	CSR	
	HR	
Sales and marketing	Sales officer	2%
	Sales consultant	
	Marketing executive	
	Advisor	

Source: EY analysis

6.1.3.3. OEM Incremental human resource requirement

It is important to understand this split to be prepared for the requisite sizing of workforce demand at an OEM. However, we must also be cognizant of the change in this mix that would occur with growth of EV technology.

Table 5: OEM - employment projection, replacement ratio in million (2018-2026)

Employment in Million	2018	2019	2020	2021	2022	2023	2024	2025	2026
Employment	.33	.28Mn	.29Mn	.31Mn	.32Mn	.34Mn	.37Mn	.40Mn	.42Mn
Additional Requirement		-.04Mn	.01Mn	.01Mn	.02Mn	.02Mn	.03Mn	.02Mn	.02Mn
Replacement		.01Mn	.01Mn	.01Mn	.01Mn	.01Mn	.01Mn	.02Mn	.02Mn
Total Requirement		-.03Mn	.02Mn	.03Mn	.03Mn	.04Mn	.04Mn	.04Mn	.04Mn

Source: EY analysis

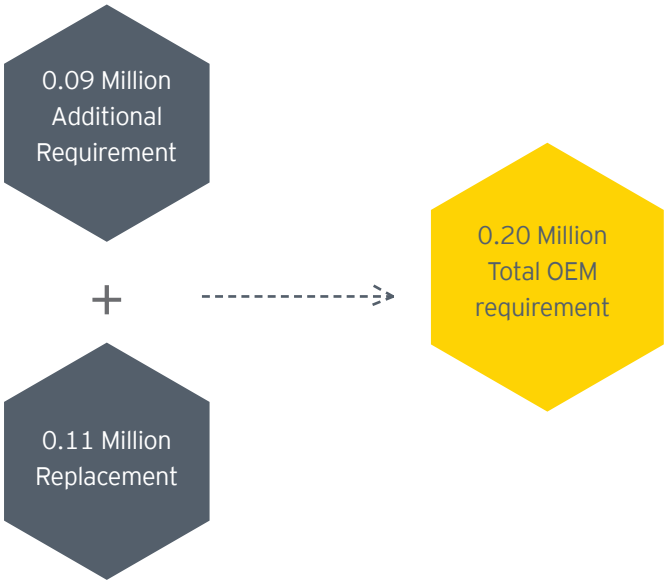


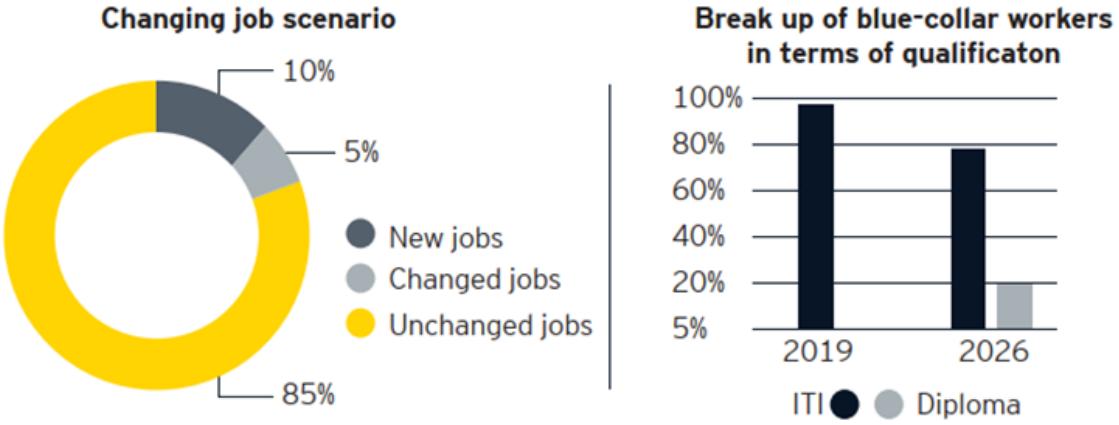
Table 6: Department/Job role wise employment by 2026

Department/Job Role	Employment by 2026 (000)
Assembly	101-80
Paint	10-8
Welding	20-15
Press shop	20-15
Logistics	30-25
Maintenance	10-8
Design	4-3
Finance	2-1
Legal	
CSR	
HR	
Sales officer	4-3
Sales consultant	
Marketing executive	
Advisor	

6.1.3.4. Impact on jobs and skills

OEMs are focused on designing cars, promoting cars, ordering from vendors and assembling vehicles. Jobs and skills for this sub-sector of the automobile industry will be least affected by vehicle electrification.

Figure 9 : Changing job scenario in the OEM industry



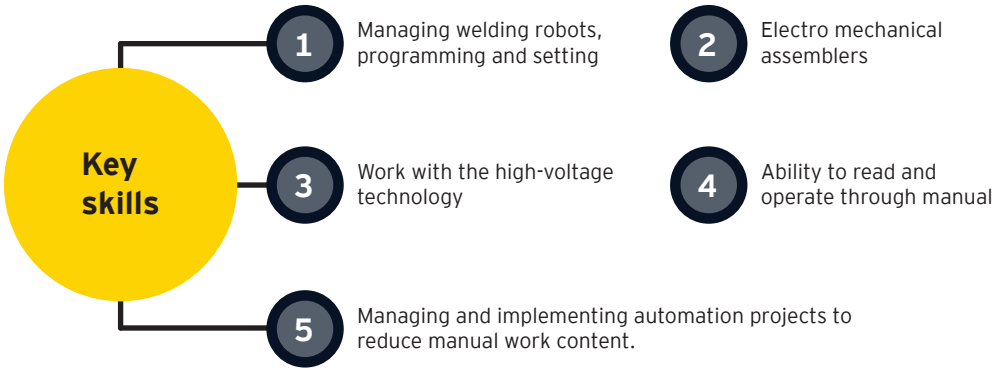
Source: EY analysis

6.1.3.5. Key job role evolution

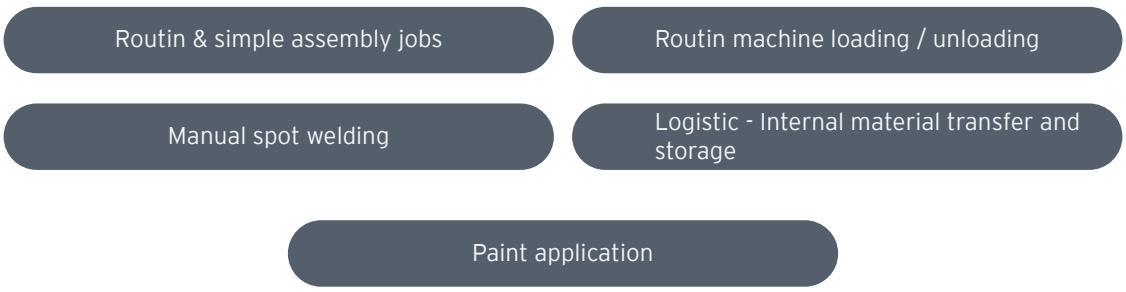
- New job roles

SN	Job role name	Skill set required
1	Electromechanical technicians	Able to assemble mechanical and electrical components and follow complex instructions, troubleshoot problems and come up with correct solutions and the ability to communicate effectively
2	Electronics technicians	Able to assemble and follow complex instructions, troubleshoot problems and come up with correct solutions, automation application and the ability to communicate effectively
3	Networks and computer system applicators	Ability to set up, install and maintain computer networks; analytical skills to troubleshoot problems and figure out better ways to improve existing systems.
4	Operators to manage robots and programming	Computation-linear algebra, geometry and basic physics, programming language and application, application of electronics and basic microcontroller for minor stoppages

- Key skill sets



- Endangered jobs and skills



- Skill set requirements of key changing job roles

Sn	Job role name	Additional skill set required by 2025
1	Assembler and fitter (vehicle)	Upskilling for electromechanical assemblers and electronics technicians
2	Welders and body processes	Managing welding robots, programming and setting
3	Assembler and fitter (Aggregate)	Managing and implementing automation projects to reduce manual work
4	Machining	Upskilling for part programming and setting
5	Maintenance (mechanical and electrical)	Upskilling for electromechanical technicians and electronics technicians with network and IT Skills

6.2. Manufacturing and R&D: Auto component

Auto parts suppliers will be the most impacted by vehicle electrification since EVs have about 20 moving parts as compared to 2,000 parts in an ICE vehicle.

The auto component industry is the feeder sub-sector to the automotive sector. Growth in all metrics of the manufacturing sector must be supported by the growth of the auto-components sector. This includes a change in core vehicle technologies, automation in production systems and new product delivery systems. Trends such as automation technology and electrification of vehicles have a strong effect on the auto component manufacturers.

Figure 10: Future trends in auto component industry [33]

▶ Size of Indian Auto Component Industry was **USD 51.2 billion in 2017-2018** ▶ CAGR of **7%** over 2011-2012 to 2016-2017 ▶ **2.3%** contribution	▶ Indian auto component industry is expected to register turnover of **USD 115 billion by 2020-2021 and USD 200 billion by 2026**	Total Employment : 3.8 Million ▶ Employment in Tier 1: 0.6 Million ▶ Employment in Tier 2: 1.1 Million ▶ Employment in Tier 3: 2.0 Million
▶ **4%** of total exports accounted by the industry with **USD 13.5 billion** size of exports ▶ Size of exports grew at CAGR of **11%** over 2011-2012 and 2016-2017 ▶ Major export markets: USA(22%), Germany (7%), Turkey (6.2%)	▶ Union budget 2018-2019 saw an increase in duty on selected items such as engine and transmission parts, brakes, gear boxes, etc. from 7.5-10% to 15% to provide **boost to domestic manufacturing**	**Reduction in corporate tax rate to 25% for SMEs** with turnover less than USD 38.46 million to benefit the sector

Fueled by the growth in automotive sales, the associated components industry is also witnessing a boom. The Indian auto industry grew by 9% in FY12[34] over the previous year. Further, exports grew by 31% in the same period to US$6.8 billion[35] (from US$5.2 billion in FY 2011). This segment has been growing at a CAGR of 13.2% over the last five years (FY 2008 to FY 2012). Furthermore, it is expected to continue the growth trend at a CAGR of 11%[36] for the next decade.

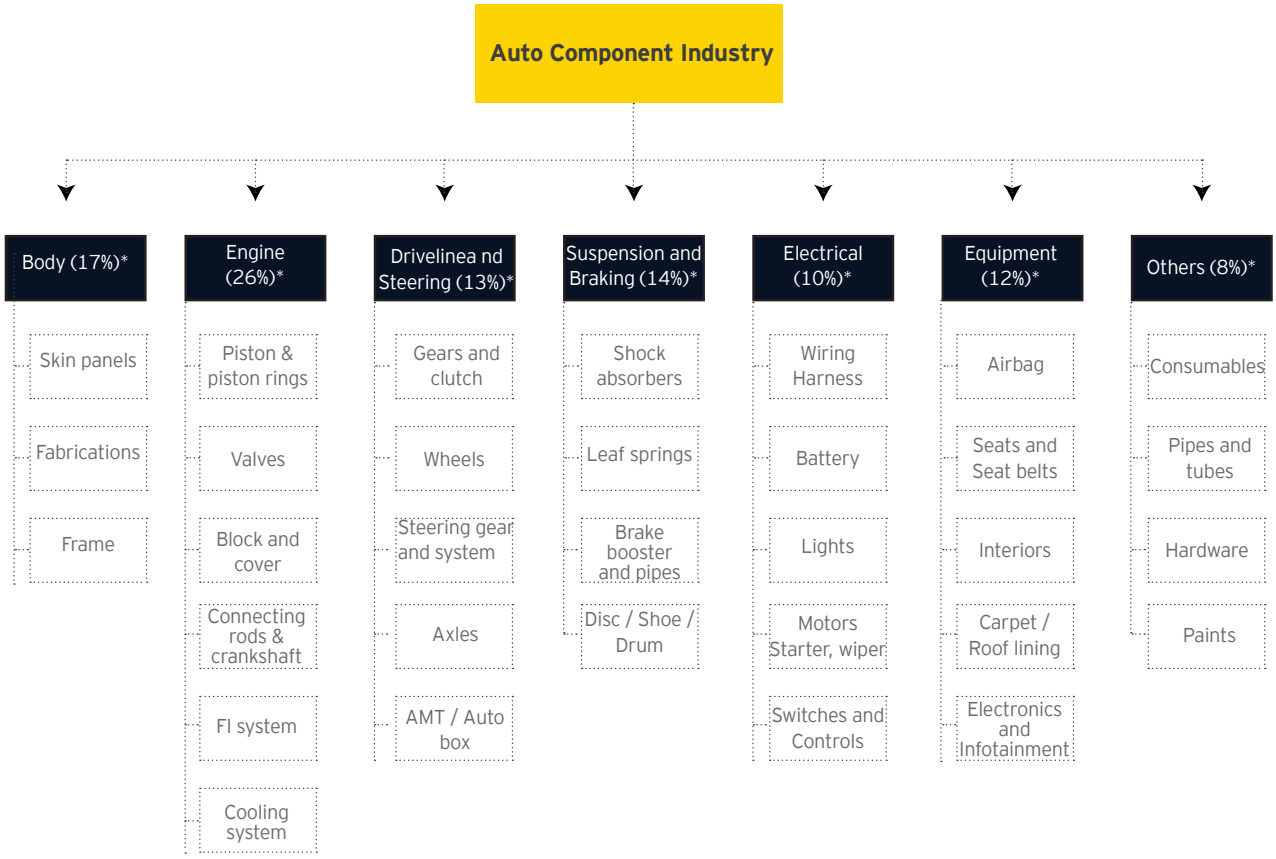
At the current level of industrial automation, one manpower added at the OEM level creates eight jobs[37] at the auto component-vendor's end. Part of the reason for this relationship is that when automation is brought about at the OEM level, added human resources are usually brought in to match the level of required efficiency at the vendor level.

However, this trend cannot continue for long and the auto component industry is slowly but surely adding automation and increased use of advanced manufacturing. Automation is reshaping the skill-set demand of the sector due to the adoption of new manufacturing techniques.

Due to this change in the required skillsets, new jobs are emerging and some of the older, more routine jobs have become redundant and obsolete. Contract workers are at the highest risk of losing their jobs because of technological upgradation, given they are mostly employed in routine and repetitive jobs.

The auto components market can be categorized under six product segments as mentioned in figure 14. Around 40% of the market share is taken up by engine and transmission component manufacturers. With trends like vehicle electrification these two segments will be affected the most in terms of business.

Figure 11: The auto components industry in terms of turnover is predominantly divided into several segments, which as follows:



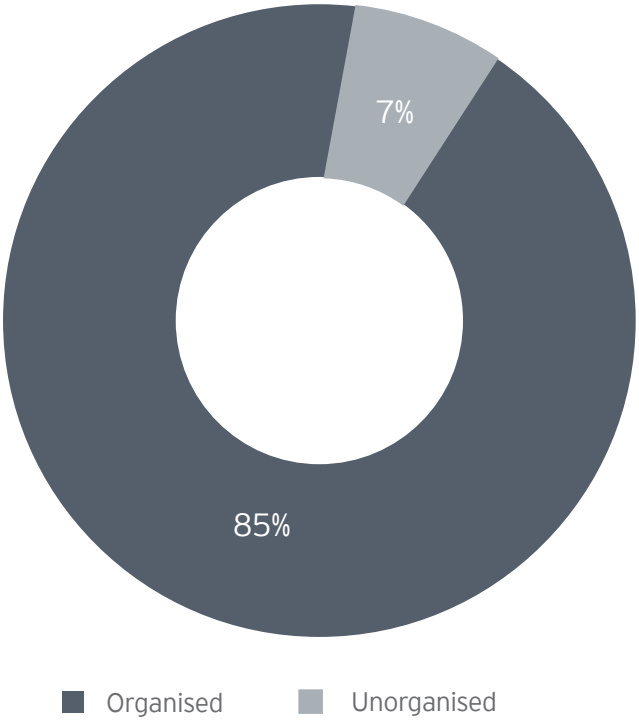
Source: EY Analysis, ACMA

[33] https://www.ibef.org/industry/autocomponents-india.aspx
[34] https://www.ibef.org/archives/detail/b3ZlcnZpZXcmMzY0NDgmMTEw
[35] https://www.livemint.com/Industry/pbuvkFgL1SCmvNkruQAIZN/Auto-exports-at-a-record-high-in-FY15.html
[36] https://www.equitymaster.com/research-it/sector-info/auto/Automobiles-Sector-Analysis-Report.asp
[37] https://timesofindia.indiatimes.com/business/india-business/1-5-cr-people-to-be-employed-in-automobile-sector-by-2022/articleshow/47977138.cms

Organized and unorganized sector

The organized sector accounts for 7% of the auto component industry but accounts from 85%[38] of the total turnover (FY 2017). Around 10,700 auto component companies are present in India, out of which 800 are ACMA members primarily comprising of tier one companies which accounts for around 0.6 million of the total 3.81 million employment. The remaining 3.21 million are employed in the tier 2, 3 and 4 companies which constitutes to around 9000-10000 companies which are mostly unorganized.

Figure 12 : Auto component organised vs unorganized companies



Source: EY analysis

Industrial production can be segregated based on usage patterns across segments. A broad classification would cover auto component production from OEM, exports and aftermarkets.

The largest growth driver for this sub-sector is resultant of increased exports by the auto component manufacturers. The sub-sector aspires to double its contribution to manufacturing GDP.

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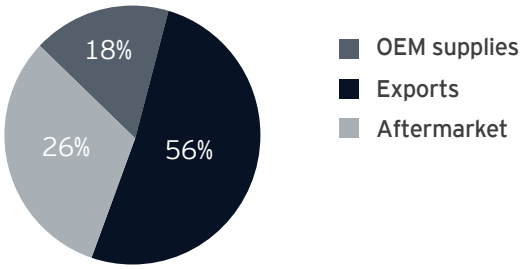
The largest growth driver for this sub-sector is resultant of increased exports by the auto component manufacturers. The sub-sector aspires to double its contribution to manufacturing GDP.

Figure 13: Share of auto component industry turnover percentage



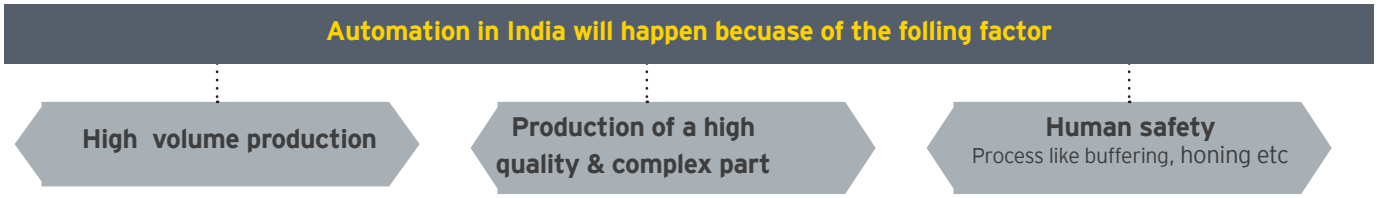
Source: ACMA

The industry feels that the IC engine still has a usable context for the next four to five years. As for the electrification of vehicles, it was expected that the results will be through hybrid cars as the technology is presently customer friendly without any additional external infrastructure requirement vis-à-vis BEVs which has issues of range anxiety, charging time, charging infrastructure requirements.

Further, hybrid cars developed and viable in terms of fuel efficiency will get better with BS VI implementation from 2020[39]. Therefore, in short to medium time frame, the manpower requirement should increase as the hybrid cars will require both, the traditional IC engine mechanics as well as the EV technicians. Due to both technologies present in the same car, the movable parts will also be more than the conventional IC engine vehicle and much more than the electric vehicle.

In terms of automation, India is still behind international standards. It was felt that the developed economies are more dependent on robots due to the higher cost of human resources, whereas easy availability of labor at cheaper costs in India did not create the required urgency for automation. Therefore, the level of automation that most manufacturing plants can invest in is limited. Typically, the degree of automation is a function of the plant capacity and the vehicle target set for the respective OEMs.

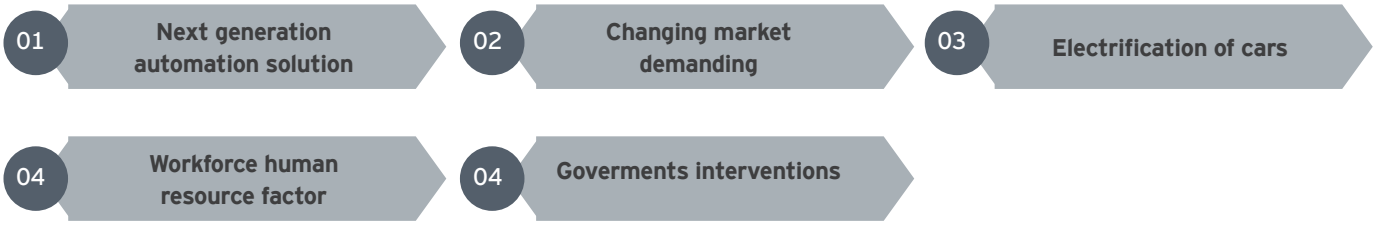
[38] ACMA
[39] What are BS VI Norms? https://www.businessinsider.in/what-is-bs-vi-norms/articleshow/69286150.cms



Source: EY analysis

6.2.1. Sub-sector trends

The major trends of the sub-sector will be led by critical factors. These factors need to be evaluated to forecast trends.



Source: EY analysis

1. Next generation automation solutions

- In keeping with the increase in production rates, the industry has begun adopting solutions such as DCS, and MES . Marketing intelligence systems are being used to support collaborative decision-making systems in production plants. This would lead to better market-mapped production planning.
- Additive manufacturing, despite being in a prototype stage, is being adopted in some production facilities. The Asia-Pacific region with the largest share of 3D machines is expected to grow at CAGR of 11.07% between 2017 and 2022 to US$2.13 billion[40] by the year 2022. This growth is mainly driven by the increasing demand for 3D object analysis in modern manufacturing processes. This will bring about a qualitative change in skillsets required on the shop floor.
- IIoT is also being used for plant management and control systems. DCS solutions integrated with plant management is one of the biggest trends in the automation market currently. Its incorporation is improving decision making capacities and reducing failure rates, therefore contributing to overall efficiency and productivity.
- While the adoption of virtualization is currently limited, companies are investing or planning to invest in the virtualization of their control systems to increase visibility, ensure faster crisis management and simplify system deployment. Further advantages include better quality assurances and a decrease in the number of physical servers. This will yet again contribute towards enhanced efficiency and need skill alignment of manpower.
- There has also been an increase in the adoption of industrial robots. Globally the market is expected to grow from US$38.11 billion to US$71.72 billion[41] at CAGR of 9.6% from 2017 to 2023. Therefore, requisite manpower is required to design, manage and maintain this technology.
- Overall, our analysis suggests that the industry has somewhat mixed opinions when it comes to the speed in which it will upgrade or adopt automation. Automation will occur only where there is high volume, quality control challenges, large complexity of parts or critical safety issues.

[40] https://www.marketsandmarkets.com/Market-Reports/3d-4d-technology-market-646.html
[41] https://www.prnewswire.com/news-releases/industrial-robotics-market-growing-at-a-cagr-of-960-during-2017-to-2023---reportsnreports-635515263.html
[42] https://www.business-standard.com/article/companies/auto-components-industry-growth-to-moderate-to-10-12-in-fy20-119030900394_1.html
[43] ibid

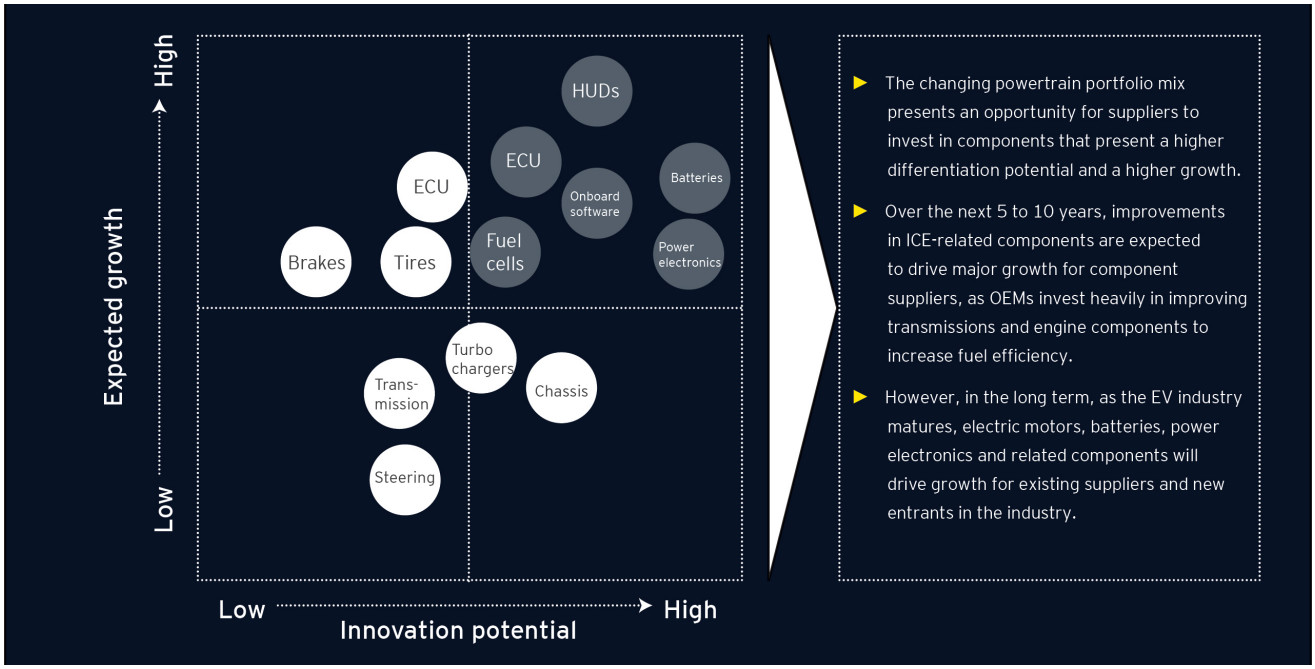
- However, whatever the pace, automation is slowly being embedded into manufacturing processes and production environment, impacting qualitative employment of workers. For example, across some component suppliers, while the growth over last five years has been approximately 200%[42] , however, the corresponding growth of manpower is pegged at about 30% [43] .

Automation as currently seen, is being brought about to the machines already being used. For example, a clamping machine or guiding robots is being added to the older setup. Therefore, instead of getting a completely new setup, new automated machinery module is added to the existing machinery, to increase the capacity.

2. Electrification of powertrain

- As OEMs prepare themselves for the electric car, so must the auto component industry. The fact that EVs have a completely different technology and lesser movable parts is a concern for the auto component manufacturers. Therefore, they must develop expertise in systems like batteries and electric motors and vehicle management computers which will be the main component for EVs.
- The industry feels that vehicle electrification will be slower than what appears to be the common sentiment across customers. Irrespective of the pace of change, it is safe to assume that ICE, HEV and EVs will coexist for a long enough period of over 8-10 years. This would give adequate opportunity for people to realign their skill sets. This expectation, however, may get disrupted, in case government regulations will push towards a much faster implementation of EVs across the country.
- The innovation in development and launch of electric vehicles does provide an opportunity to the auto component manufacturers to realign investments towards high-growth components that will cater to future vehicles. For example, products such as the charging power train portfolio mix presents an opportunity for the auto component manufacturers to invest in components that have a higher differentiation and growth potential. The trend of electrification will move the auto component manufacturers away from engine parts, radiators and gears, to be replaced by electric motors, batteries and microprocessors. Components such as steering, seats and brakes will undergo a technology change and component manufacturers will have to upgrade their manufacturing systems and the skills of the people who run them.
- Over the next five to 10 years ICE technology is expected to drive growth for component manufacturers. Following which electric motors, batteries, power electronics and related components of the EV industry will drive the market.

Figure 14: The electrification of the industry will require component suppliers to realign their investments toward high growth components



Source: EY Analysis, ACMA

3. Changing market demand

With India becoming a prominent player in the global automobile market, a healthy growth scenario is envisaged for component manufacturers. Additionally, advent of many foreign players in Indian market, will lead to a potential market for supporting their production and services. These market factors have a strong positive effect on the auto component manufacturing industry.

To begin with, India has become a hub for small car manufacturing. The sector has also become an investment magnet. Domestic and foreign OEMs have lined up investments of almost US$10 billion[44] over the next few years.

As the middle class grows in financial strength, there has been a shift towards the luxury car segment. In 2017, the luxury segment of cars grew by 17% YoY[45]. The luxury segment market of India is expected to grow at CAGR 25%[46] during the period between 2017 and 2020. The customer is also becoming more technology savvy and demanding better electronics and safety measures in the cars that they buy. Therefore, an overall growth in this segment and additional features will bring about an upward trend for component manufacturers. Even though most of these trends appear to affect the OEMs directly, more than the auto component industry, every single one of them points towards the potential of growth for auto component manufacturers. They must actively invest to match the requirements and pace of the OEMs, bring about a synchronicity of technology and mirroring the efficiency parameters of OEMs. They would also need to build sufficient capacity for new segments, such as the luxury segment, to match the movement of the market. This will require new levels of automation, production planning, capacity, equipment, training and skilled manpower.

4. Human resource factors

There is a large salary difference between the workers in working at OEMs vis-à-vis those working in the auto component industry. For certain roles, the OEM can pay much higher salary in comparison to an auto component manufacturer, for the same amount of work. Consequently, this is leading to lower attractiveness for auto component jobs or, with tendency for workers moving from auto component manufacturers towards opportunities to work for OEMs. This salary disparity exists at both the staff (white collar) and the worker level (blue collar).

Auto component companies consistently highlight this challenge with respect to OEMs. Tier 1 Auto component manufacturers, who sell to OEMs directly, usually work on smaller margins. As a result, they are unable to pay wages beyond the minimum wage slab, let alone match the compensation paid by OEMs to similar skill level resources. The situation becomes more challenging for the tier 2 and 3 auto component manufacturers.

Need for better training: With most blue collared workers at auto component manufacturers come from the contractual pool, there is a lack of proper and defined career path for them. The skilled manpower requirement of auto component manufacturers is usually unfulfilled, in terms of quality. Most of the manpower that is employed by the manufacturers come with some certification from ITIs and polytechnics. However, the quality of training at these institutions is not mapped to the requirement of a modern manufacturing plant. Therefore, most auto component manufacturers prefer to rely on their in-house training capacities.

The industry has an urgent need of skilled resources brought in as a pre-requisite, through the formal education or ITI system. However, both these supply avenues are largely wanting in meeting this expectation.

"The Machinist now requires the understanding of CNC programming. He does not need the muscle memory and control we valued so highly for our older workers, such skills have been automated."

5. Government interventions

The automobile sector has been a focus sector for the government. Since the sector has been a major contributor to the nation's economy and has been one of the largest sectors to provide jobs, it is a critical sector for the government. The GoI, to boost the manufacturing sector, passed a national policy with the goal of increasing the share of contribution to the GDP, setting an ambitious target of 25% by the year 2025, up from 7 % in 2018[47].

[44] https://economictimes.indiatimes.com/industry/automobile-companies-are-betting-big-on-india-investing-in-building-new-capacity/articleshow/47621633.cms?from=mdr
[45] https://economictimes.indiatimes.com/industry/auto/cars-uvs/luxury-car-sales-on-track-for-a-new-high-this-year/articleshow/64969204.cms?from=mdr
[46] https://economictimes.indiatimes.com/news/company/corporate-trends/indian-luxury-market-to-cross-18-3-billion-by-2016-assocham/articleshow/50480833. [40 40] cms?from=mdr

The Department of Electronics and Information Technology (DEITY) has initiated the Automation System Technology Centre (ASTeC) program to provide national leadership in collaborative R&D for innovative technological development in the field of automobiles. Under ASTeC, 11 technology development projects have been initiated in the areas of perception, control, and learning systems[48]. Therefore, the sector has received consistent support from the government.

At the same time, any changes in taxation norms, emission norms and other regulatory events, affect the industry, due to the impact that these changes have on consumers. The government has been pushing for better safety and emission norms. GoI is currently reviewing its emission norms roadmap and has decided to move to Bharat Stage (BS) VI by 2023[49], skipping stage BS-V standard. In terms of safety, all vehicles have to must comply with the National Standards (IS) and the Automotive Industry Standards (AIS) by 2022[50]. These standards put great significance on crash avoidance and the requirement of compulsory airbags, Anti-Lock Braking Systems in two-wheelers, combined braking systems and warning systems such as mandatory reverse parking sensors, speed warning systems and seatbelt warning system.

Therefore, it is imperative to be cognizant of the changes brought about by governmental intervention. Auto component manufacturers must gear up to produce and replace the components, as required by these changes.

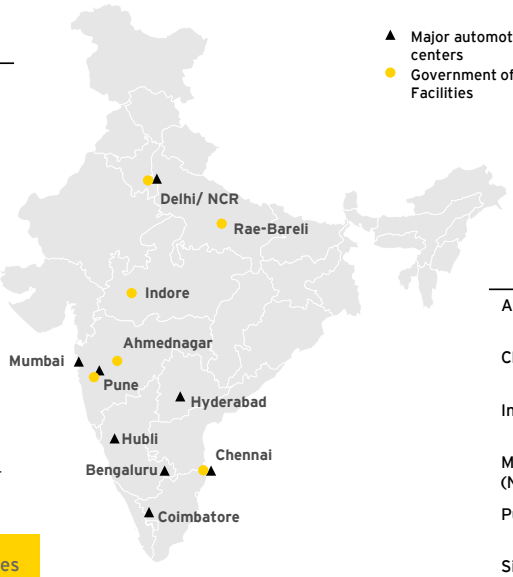
6.2.1. Sub-sector trends

There are seven major auto component manufacturing clusters in India:

Figure 15: Auto component manufacturing cluster

Cities	Major automotive R&D centers
Bengaluru	Arvin Meritor, Delphi, GM, Siemens, Robert Bosch, Honeywell, KPIT Cummins, Daimler, Federal-Mogul
Chennai	Caterpillar, Ford, Renault-Nissan, Visteon, Fiat
Coimbatore	Robert Bosch, Hirotec India
Delhi NCR	Maruti Suzuki, Eicher, Escorts, Delphi, HMSI
Hubli	Neilsoft
Hyderabad	Hyundai
Mumbai	Renault
Pune	KPIT Cummins, Dana, Eaton, Johnson Controls, John Deere, TATA Engineering Research Center (ERC), PACCAR

Apart from above, other major IT companies such as TCS, Wipro, Infosys, etc also provide auto engineering services



Cities	Govt of India (GOI) Facilities
Ahmednagar	Vehicle Research and Development Establishment (VRDE)
Chennai	Global Automotive Research Center (GARC)
Indore	National Automotive Test Tracks (NATRAX)
Manesar (NCR)	International Center for Automotive Technology (iCAT)
Pune	Automotive Research Association of India (ARAI)
Silchar	National Institute for Automotive Inspection, Maintenance & Training (NIAIMT)
Rae-Bareli	National Center For Vehicle Research & Safety (NCVRS)

Source: Primary research, secondary research and company website information

Source: EY analysis

[47] http://planningcommission.gov.in/aboutus/committee/wrkgrp12/wg_mfg.pdf
[48] Ministry of Electronics and Information Technology. https://meity.gov.in/content/electronics-systems-development-application-division
[49] https://www.news18.com/news/auto/all-about-bs-vi-emission-norms-reason-why-maruti-suzuki-decided-to-discontinue-diesel-cars-2117871.html
[50] ibid

6.2.2.1. Workforce distribution based on functions

60% of the workforce is deployed in the production and maintenance.

Table 7: Workforce distribution in a typical tier 1 auto component manufacturing factory

SN	Job role name	Percentage composition of total employed (2019)	Percentage composition of total employed (2026)
1	Production (forging)	25	15
2	Production (machining component)	20	10
3	Maintenance	15	10
4	Design	5	5
5	Sales and marketing	10	5
6	Training	5	10
7	R&D	5	15
8	New product development	5	15
9	Systems	15	15
	Grand total	**100%**	**100%**

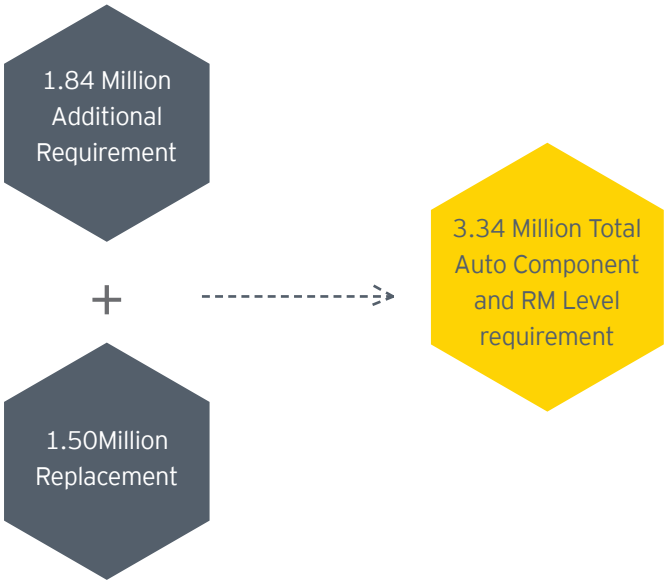
Source: EY Analysis

6.2.2.2. Auto component incremental human resource requirement

Table 8: Auto component – employment projection, replacement ratio in million (2018-2026)

Employment in Million	2018	2019	2020	2021	2022	2023	2024	2025	2026
Employment at tier 1 and tier 2	1.75	1.68	1.81	1.95	2.05	2.15	2.25	2.36	2.48
Employment at RM level	2.06	2.0	2.18	2.38	2.52	2.67	2.83	2.99	3.17
Additional Requirement		-.13	.31	.34	.24	.25	.26	.28	.29
Replacement		.15	.16	.17	.18	.19	.20	.21	.23
Total Requirement		**.02**	**.47**	**.51**	**.42**	**.44**	**.47**	**.49**	**.52**

Source: EY Analysis



Source: EY analysis

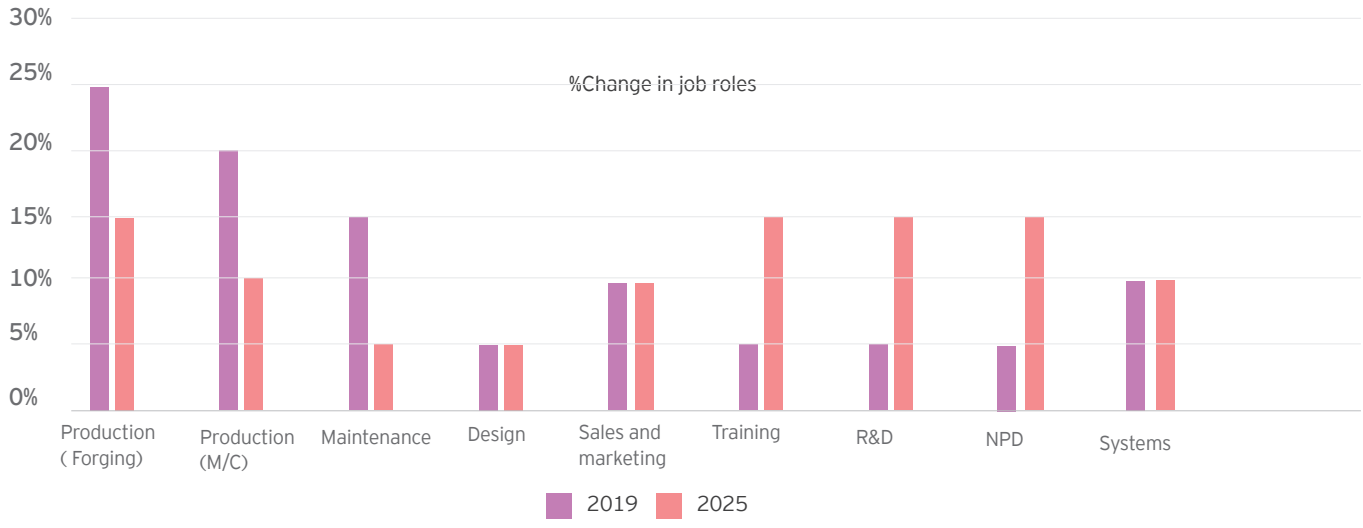
Table 9: Department/Job role wise employment by 2026

Department/Job Role	Employment by 2026 (000)
Production (forging)	400-500
Production (machining component)	280-330
Maintenance	280-330
Design	120-160
Sales and marketing	120-160
Training	280-330
R&D	400-500
New product development	400-500
Systems	400-500

6.2.2.3. Impact on jobs

a) Function wise change in jobs

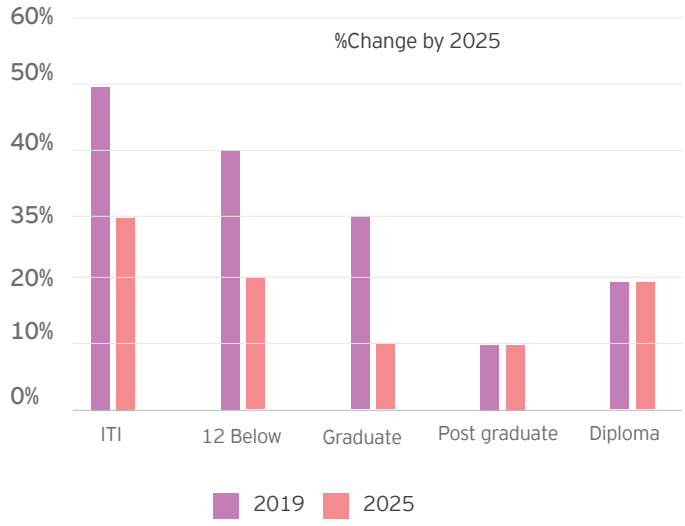
Figure 16: Change in job roles 2019-2026



Source: EY analysis

- Increase in R&D: Due to electrification and safety trends organizations will be required to invest in R&D with the changing demands.
- Requirement for trainers to reskill the entire workforce currently deployed.
- Mechatronics machinery and tools low maintenance: Unlike current machinery which breaks down constantly and require maintenance, future machines are likely to require less maintenance. ww

Figure 17: percentage change in workforce qualification



Source: EY analysis

b) Change in workforce qualification

- **Recruitment from ITIs will reduce:** The current ITI structure doesn't support the futuristic trends in their curriculum. To cope up with this ITIs are partnering with industry to update curriculum and launch courses in Industry 4.0 technologies.
- **Recruitment from higher education institutes will increase:** Due to automation and advanced machinery starting to be embedded on the shop floor the industry requires manpower with good theoretical knowledge and problem-solving skills, besides practical experience. Therefore, organizations are moving up the supply chain to fulfill this requirement through higher technical education institutes.

c) **Workforce distribution:** By 2026, the auto component industry would experience a qualitative impact on the overall workforce. Fewer jobs will be affected, not necessarily driven towards obsolescence, but impacted with a requirement of higher end technological skills for manufacturing. Automation will replace manpower with inadequate skills and add manpower with requisite skills. More skilled workers would be needed to manage technology or to analyze the information it generates, for example planners and big data analysts.

6.1.3.5. Key job role evolution

- New job roles

Equipment Maintenance Technician

- Install, maintain and repair mechanical and electrical systems, factory automation and robotics
- Perform Preventative Maintenance (PM) on all industrial production and mechatronics equipment
- Perform Corrective Maintenance on Electrical systems, Mechanical Systems, Conveyor Systems, Hydraulics, Pneumatics, OLC and networks, Robotics

Operations and Maintenance Data Analyst

- Assist with software development, form requirements gathering and architecture, through coding, testing and deployment
- Development, enhance and critique data processing techniques to evaluate performance and find malfunctions
- Evaluate energy generation performance of components
- Perform comparative analyses between equipment manufacturers
- Mine raw data to identify trends in equipment reliability, installation quality, degradation, etc.
- Create reports and presentations for upper management, finance partners and others
- Write scripts, macros and programs to automate routine analyses and actions

Industrial Machine Builders, Mechatronics

- Building, customizing, testing and installing highly custom automated production equipment at manufacturing operations
- Perform mechanical assembly, electrical panel wiring, field wiring, troubleshooting and machine integration of industrial mechatronics equipment
- Work from mechanical/electrical drawings or verbal instruction
- Work with engineering to optimize equipment performance and related continuous improvement activities

Motor Controls Engineer

- Model, design, implement, test and benchmark the motor controls of traction motor drives.
- Understand, drive design of, and implement motor controller functionality, behaviors, and algorithms
- Develop, test, and validate motor control algorithms in the laboratory and in-vehicle
- Strong fundamentals of AC electric motors and drive system analysis, modelling and control. Basic proficiency with embedded firmware development in C/C++

Source: EY Analysis based on industry survey

- Endangered jobs

Source: EY Analysis based on industry survey

- Skill set requirements of key existing job roles: Production (forging) and machining component comprises more than 75% of the blue-collar jobs in an auto component manufacturing organization.

a) CNC machining and casting: Setup and operate CNC mills, lathes and fabrication of equipment.

New skills required

- Operate 3-axis, 4-axis and 5-axis vertical machining centers and boring mills.
- Program 2D manually, setup and operate CNC milling machines.
- Provide crucial input on design, optimization and production for machining, manufacturing and assembly.
- Review electronic or paper blueprints to ensure parts meet specifications.
- Program and setup multi axis CNC vertical mills and CNC lathes.
- High speed machining and toll path optimization.
- Excellent written and verbal communication skills and people skills, comfortable presenting ideas and issues to peer and supervisors.
- Mastery of high-speed machining and toll path optimization.
- Ability to machine complex and high tolerance components.
- Work with material like: aluminum, stainless steel, steel, plastics, copper, brass, cast iron and silicates,
- Microsoft office, word and excel.
- CAM programming software.

Dealership sales

The effects of technological developments are not restricted to the manufacturing and R&D sub-sector of the automobile industry. Automotive dealerships, the primary source of car sales is encountering transformations due to evolving mobility solutions, intensifying competition, product innovation, technology proliferation, stringent regulations and changing customer preferences.

07

Globally, the way vehicles are being sold is undergoing a definitive change. Effective pre-sales, different formats of point of sales and use of technology are some of the prominent evolutionary paradigms. A similar change is being brought about in the Indian markets, though the elements and pace of these changes may be different.

In India, car dealerships will continue to remain the connecting bridge between the OEMs and the customer. However, a marked change in the pre-sale stage is evident. Customers now browse the internet and come more prepared to the dealerships, making the initial visits even more crucial in their consumers purchasing decision.

Online presence and activity become an important tool to establish the first connect with the customer and eventually align them favorably to consider the specific option as they make their first visit to a dealership. Consequently, customer research and analytics and point of sales technologies like 3D screens, media walls, virtual augmented reality, etc. become more important.

However, traditional dealerships have a slower pace of adoption to these techniques and remain dependent on existing sales tactics, making them much more unattractive to the modern car buyer.

Overview of dealership sales

Domestic sales trends				
Sales	21.1	3.37	1.0	0.7
Category	2 WE	PV	CV	3 WE
Total vehicles sold ('18-19): 26.2 milllion **All sales figures in million.**				

Sales outlets and employment		
Category	Dealership	Employment (million)
Passenger and commercial vehicle	12,500	1.5
Two and three wheeler	12,500	0.56
Two wheeler sub-dealership	62,000	0.93
Total	87,000	3.0

Source: EY analysis

Another pertinent issue is the preparedness of the sales force in most Indian dealerships. Inadequately trained sales personnel are unable to connect to the modern vehicle buyer and unable to answer questions in an accurate, factual and reliable manner. Insufficiency of competitive knowledge, communication and negotiating skills are leading to ineffective sales interactions.

Automotive retail sales need to adopt advanced technologies to enhance the customer experience, during the buyer's decision-making process. Additionally, the salesforce needs to upgrade itself to adopt effective sales techniques, enhance their understanding of the product, segment, competitive offerings and future technologies being introduced, to be able to address the buying criteria of a well-informed customer segment.

Other factor affecting dealerships are rentals and employee costs. With the increase in competition and the growing number of dealerships, shrinking margins have become a challenge at the dealerships. Additionally, the dealerships now face a tighter goods and service tax regime, higher inventory costs and falling margins from insurance and vehicle finance companies. Therefore, an overall stretch on the margins is being felt by dealerships. Our analysis suggests that given these challenge, enhanced marketing and digital environment for the dealerships, their current physical size and workforce size will no longer remain feasible soon.

The changes in business requirement will lead towards a trend of forming dealerships that rely less on large spaces, overflowing with workforce and more on smaller floor spaces manned by a highly skilled and effective workforce, much lesser in number, armed with the latest digital equipment. Armed with technologies like virtual reality headsets, 3D displays and touch-screens, modern dealerships can provide the customers with a more customized and engaging experience of the vehicles. In most cases today, the dealerships have only the higher end / top of the line models on display, leaving the customers wanting and in terms of experiencing the other variants of the vehicle. However, digital experience of the variants can bridge this gap and lead to furthering the potential of purchase.

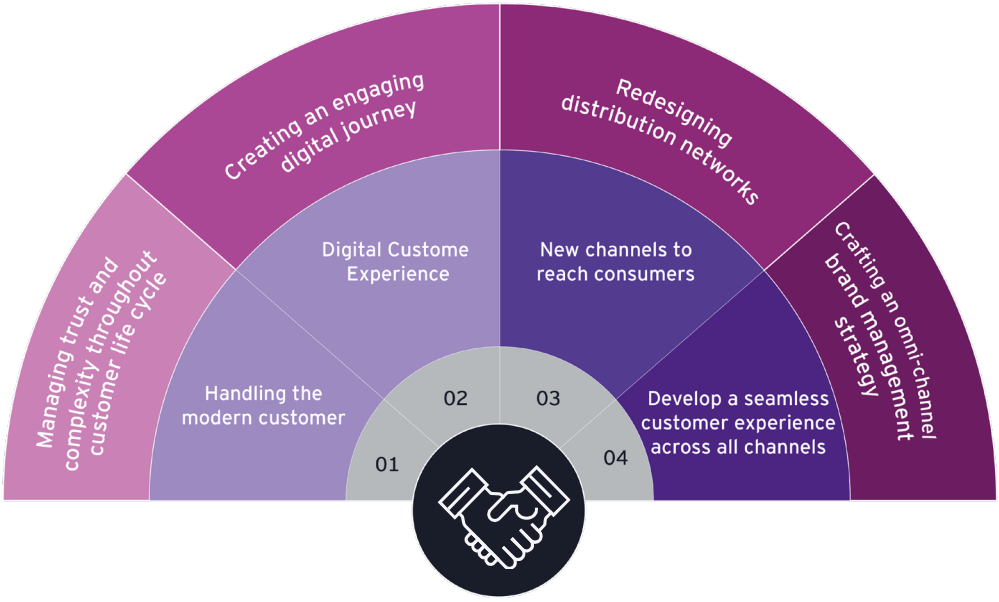
The dealership sales sub-segment must evolve with the times, to remain viable. However, changing the real-estate size, the composition and size of the workforce, or the digital equipment and marketing approach of the dealerships should be matched by a change in the abilities and training of the workforce that manages the new dealerships.

7.1. Sub sector trends

The major trends in automotive retail are leading the industry towards a more customer-centric approach, over the previously followed product-driven approach.

There is a paradigm shift in auto retail that can be seen in the industry. This will drive a major trend in auto retailing over the next decade, with emphasis on four key pillars:

Figure 18: Key pillars driving paradigm shift in auto retailing



Source: EY Analysis

I. Handling the modern customer

Modern customer has access to resources in form of mobile phones, digital experiences and social media. Even before stepping into the dealership, they are already in possession of facts such as vehicle performance, the cost of ownership and financing and ownership and after sales experiences of other customers. They demand a personalized and relevant customer experience through the purchase, ownership, and after sales experience journey.

- Being well informed and demanding personalization of experience are defining characteristics found in millennials, a large section of the first-time buyer segment. This is highly relevant, given that by 2025[51] , 75% of the Indian workforce will comprise of millennial's born between early 1980's and mid 1990's. Thus, over 50% of the buyers of new vehicles will belong to this age bracket.
- The online-shopping trend has greatly affected this segment. Following the existing trends, everything from clothes to groceries is being purchased online and delivered to one's doorstep. The modern customer spends hours researching their purchase decision to narrow in on the best product to meet their needs. It is this trend that will extend into the automobile industry. It will change the way vehicles are purchased. With the growth of information technology, everything that needs to be known about a vehicle is available on the internet. Besides the major change in the profile of the customer, as described above, the requirements of the informed customer have also become specific. Through our survey we found that most customers visit the dealership with specific expectations of:

[51] https://www.shrm.org/shrm-india/Documents/EMAW8.pdf

- **Seeking a test drive**
- **Discounts and financing offer on the purchase**
- **Different colors and variation of vehicles**
- **Doubts concerning maintenance, costs of servicing and special offers from the dealership**
- **Receiving an estimate of the trade-in value of their old car**

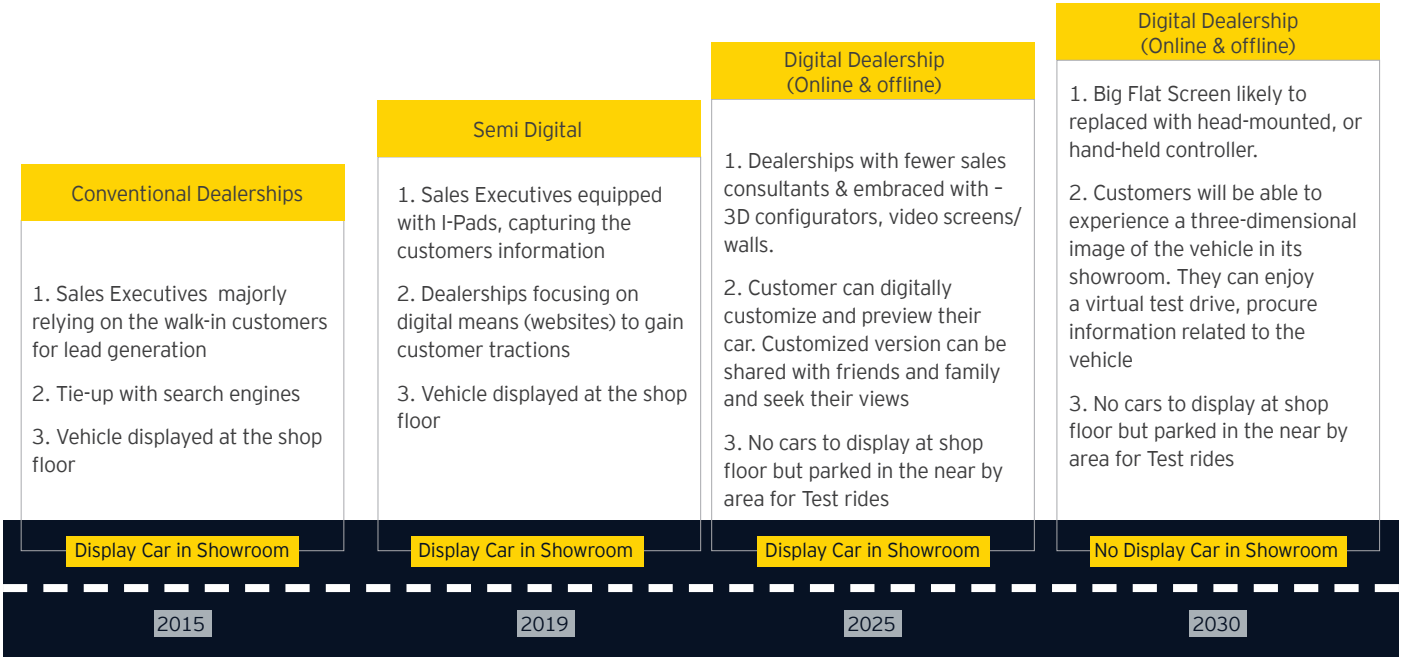
- **An overall lack of passion for the job.** Car sales is not a chosen field for most individuals in the sales force. They join young and use it as a stepping stone to other professions in marketing, OEM workforce, FMCG sales, insurance, etc. In most cases, the vehicle sales consultant is not motivated and passionate about the product (the vehicle) that they are selling. This gets compounded by their lack of technical knowledge and minimal clarity about their career path, impacting their performance and productivity. Therefore, it is imperative that the industry make the job more aspirational, rewarding and have a structured mechanism to facilitate career progression.

The modern dealership must recognize the unique profiles and criteria of their different customer types, who are much more informed than earlier times. This can be addressed by recognizing specific requirements of customers and investing adequately in enabling their salesforce through training and career growth opportunities

II. Digital customer experience

To decipher the modern customer, it is important to appreciate their digital profile, as this aspect helps largely define today's customer. The modern customer has connected machines, large displays and sound systems in their home. They are no longer impressed by the traditional experience in a dealership. The dealership should be able to delight the customer through exceptional experiences. Figure 21 presents a hypothetical evolution of the dealership model. Presently, sales executives often use iPads as display tools to display detailed views of the vehicle to the customer. In the future, one can expect dealerships with 3D configurators and wall sized video screens. Incidentally, a few dealerships have attempted the third evolution of dealerships (as presented in the figure 22) but failed to make the best use of the same. The reason for this failure was the inability of the sales consultants to properly use the modern equipment, leading to a worsening of the customer experience. This example gives further evidence that the skill level of the workforce must be upgraded to the level of the equipment used to make the best use of modern technology.

Figure 19: representative model of ideal amalgamation of online and offline experiences under Digital Dealership



Source: EY Analysis

Hence, it is very likely that such technologies will be brought into use by late 2020s. This will not only address the digital preference of a customer but will also solve the issue of optimization of space that the present dealerships suffer from.

a. Enhanced customization paradigm

Since the customer experience is now full of digital touch points, largely attributed to the internet and mobile phone penetration, various applications and platforms are now being used to connect with the buyers, promote offers, collect feedback and deliver customized messages and advertisements. The modern dealership must connect with the users through such media for all its offerings, e.g., test drive invitation, first visit, sale, repair, replacement, etc. The more customized an experience the dealership can provide, the higher the chance of developing loyal customers. Given the value of customers as word-of-mouth advertisers, it is also possible to create a 'refer a friend' plans and offers.

The dealerships must also begin approaching their customer much before the customer realizes their need to purchase a car. Modern dealerships must realize the power of data analytics, which has the power to predict customer preferences on vehicle variants, colors and features, segmented on the basis of economic brackets, vehicle browsing history on car portals and other demographic details. Data required to make such predictions are now easily available through car portal and price search websites, survey forms, etc.

This function gives rise to a new job description for a data analyst, a must for the modern automobile dealership. At present, the personnel manning this position use simple tools like spreadsheets to generate basic data analysis. The data analyst role for the modern dealerships will require a much higher degree of analytical expertise, especially with big data analytics.

The modern dealership must adopt highly engaging digital interface while interacting with their customers to enhance their experience and provide customization of services, along with appropriately trained consultants to leverage this interface.

b. New channels to reach the customer

The modern customer researches about vehicles and has an opinion based on experiences and reviews of other customers, even before they enter the dealership. Likewise, the modern dealership should research the customer segment, their preferences and their motivation to engage more effectively with the customer. It prompts the need for customer analytics, hence it is critical to recognize and address these new channels.

- **The customer journey begins at a digital level:** The modern customer first gets their information from the internet. Social media outlets, review sites and car comparison websites are some of the first places the customer goes to look for information. Dealerships must have adequate touch points on such outlets to be able to provide the right information to the customer. For example, automobile dealerships should have affiliations with all major car portals such that the customer is able to find out about the dealership in the location that they search in. Presence on such outlets, with authentic information increases customer trust and leads to a potential visit to the dealership.
- **Customer relationship management (CRM):** At present, the CRM options for most dealerships begin and end at telephone-based customer care. However, with online data collection and buyer behavior monitoring services, it has become increasingly convenient and essential to collect and analyze customer data. Such data can then be delivered in appropriate formats to the CRM personnel, who can then act on the data to create leads. The modern CRM personnel should have the skills to determine how to engage with the leads generated from this data. Training for the modern CRM personnel must include such soft skills.
- **Customer lifecycle management:** With the improved economic situation within the country, vehicle buyers are increasingly becoming repeat purchasers. Therefore, customer experience – before, during and after – purchase becomes important and valuable to the dealerships. Even for single time purchasers, after-sales service, spares replacement, repair and maintenance services can be opportunities to keep the customer happy, leading to word-of-mouth advertisement.

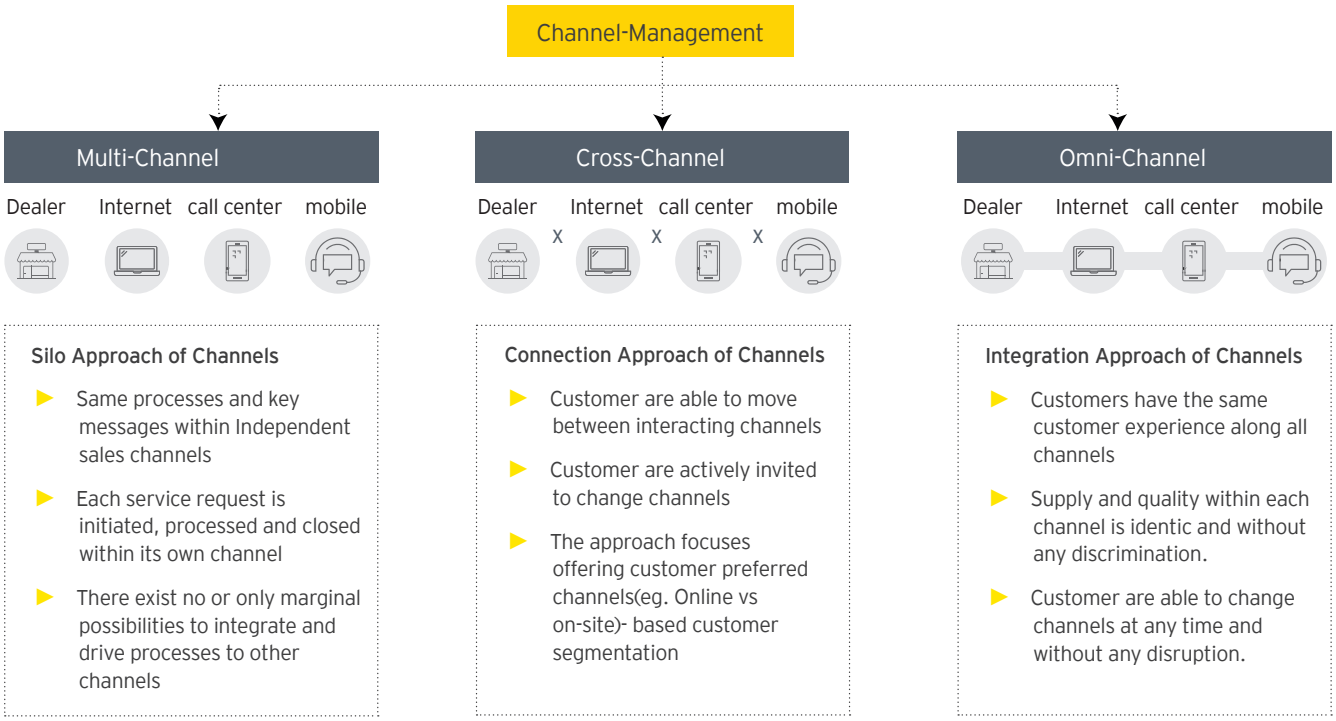
The dealership of the future should be in regular communication with the customer, relaying useful information about the vehicle, offers for an upgrade or new purchase, or offers on servicing maintenance and other value-added services. The experience of the vehicle will no longer be restricted to the physical possession of the vehicle.

The modern dealership must focus on creating a compelling digital presence, to provide easy access to prospective customers. It should invest in effectively managing customer life cycle, through focused CRM spanning the customer lifecycle, delivered by engaged and skilled employees.

III. Omni-channel service

At present most dealerships provide a cross-channel experience, i.e., customers are given the options for multiple services under the same roof, but the source of the service is not necessarily the same, leading to a disparity in quality of services, punctuality and continuity of the customer experience. The modern customer wants to experience the same quality, accountability, delivery time promise and continuity of service for all the different services that they choose to access, in other words – an omni-channel experience.

Figure 20: Digitalization-from multichannel over cross channel to omni channel



Source: EY Analysis

The omni-channel service means ensuring seamless customer experience throughout different sales, marketing and communication channel. The modern customer is very particular when it comes to the efforts that they take to get the things they want. They demand that all possible service and products be available to them under one roof or with minimum discontinuity of service. They also demand that the transition from one channel to another, e.g., from a virtual tour to the actual tour, should not disrupt or change the experience to a great degree. This includes the preferences or configurations (of the vehicle or the purchase) when they move from, say, the online medium to the dealership, or vice-versa. The modern customer also demands that all services be available to their preferred or convenient channel. This means, that the online channel, essentially the dealer's website or mobile application, have the same bouquet of services available for choosing, as would be if the customer was at the dealership.

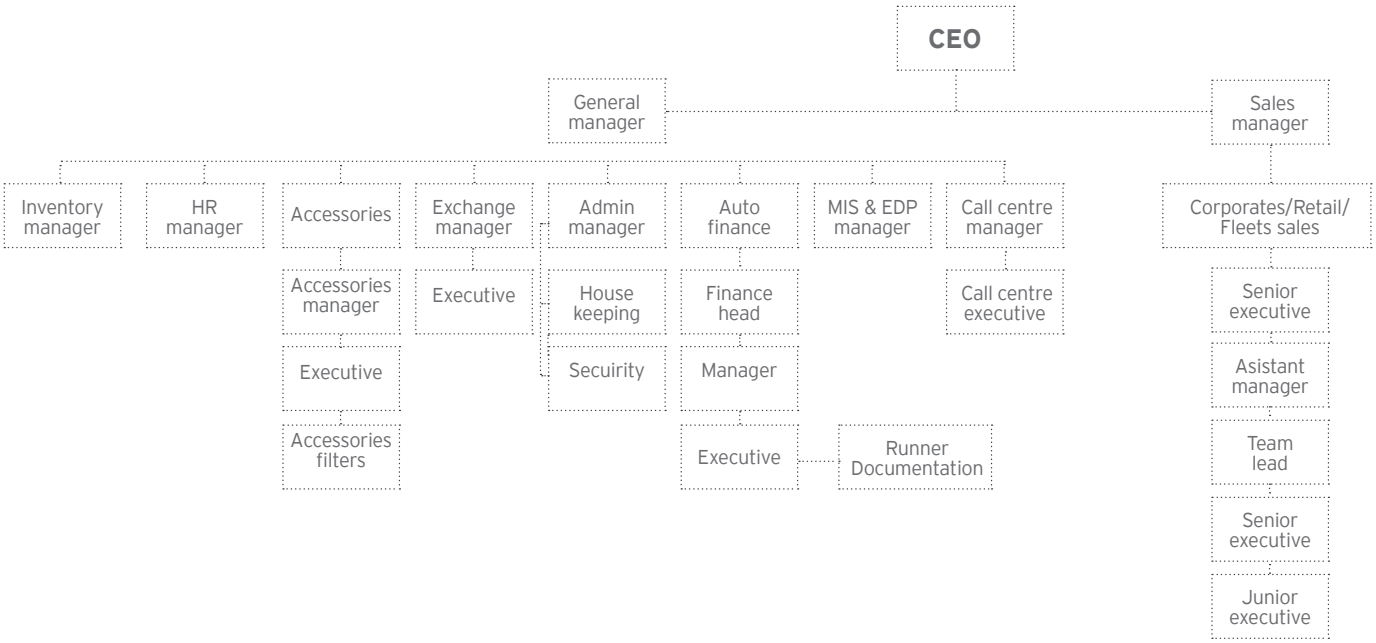
7.2. Demand Analysis

With higher disposable income and an increasing millennial segment, it is envisaged that a higher number of vehicles will be sold, leading to a healthy growth. This demand will be led by customers from tier 2 and 3 cities. Therefore, the manpower demand for dealerships will be maintained. Additionally, the customers are willing to pay a higher price in return for a more delightful experience.

7.2.1. Departmental functions of sales dealership:

Approximately 70% of the workforce in an auto sales dealership is related to sales or supporting services[52]. Of this, 40% are sales consultants, who directly interface with the customers. The remaining workforce consist of positions such as team leaders, assistant managers and senior manager sales. Associated sales activities at the dealership are also carried out by them.

Figure 21: Organizational design of a sales dealership



Source: EY Analysis, of the primary survey data

[52] National Skill Development Corporation (NSDC)

7.2.2. Geographical distribution

Whereas vehicle manufacturing is concentrated in certain geographical clusters, dealerships are spread across the country. Given the expected rise of the middle class, it can be predicted that the concentration of dealerships will continue to diffuse from metropolitan cities to tier 2 and 3 cities in the coming years.

Table 10: State wise count of 3S (sales, service and spares) dealerships

#	States	Dealership (3 S facility)
1	Tamil Nadu	2191
2	Uttar Pradesh	1800
3	Karnataka	1720
4	Maharashtra	1499
5	Madya Pradesh	1453
6	Kerala	1296
7	Gujarat	1285
8	Telangana	990
9	Rajasthan	920
10	West Bengal	760
11	Punjab	701
12	Andhra Pradesh	650
13	Chhattisgarh	650
14	Haryana	616
15	Bihar	443
16	Odisha	395
17	Delhi	350
18	Jharkhand	350
19	Assam	255
20	Uttarakhand	180
21	Himachal Pradesh	150
22	Jammu and Kashmir	124
23	Goa	90
24	Chandigarh	80
25	Tripura	30
26	Puducherry	28
27	Mizoram	25
28	Manipur	22
29	Meghalaya	22
30	Arunachal Pradesh	21
31	Nagaland	20
32	Andaman & Nicobar Island	18
33	Sikkim	15
34	Dadra Nagar Haveli	2
	Total	**19151**

Source: FADA

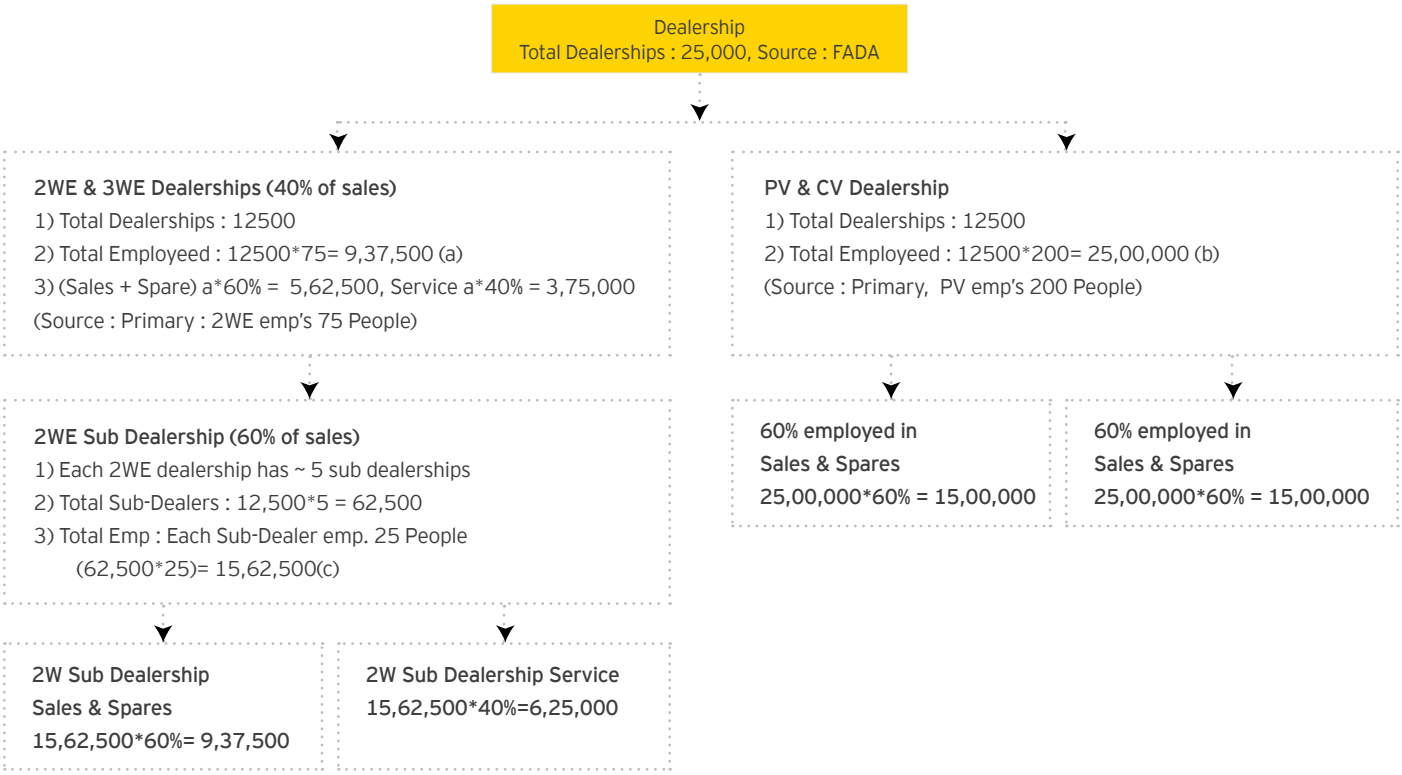
It is evident that the overall number of dealerships will not see a deceleration, with a relative growth in tier 2 and 3 cities. However, given the trends described earlier, focus is on adopting an increased digital interface at dealerships. It is likely that the size of the dealerships may reduce. Therefore, considering the decrease in the size of dealerships as well as the increase in the display technologies, it is expected that the number of personnel employed per dealerships may decrease year on year. This means that despite the increase in the number of dealerships across the country, the number of personnel employed at existing dealerships will not grow due to a reduced requirement of personnel per dealership.

7.2.3. Employment scenario in sales dealership

Based on inputs from FADA and EY's research and analysis of data from industry archives, websites, and publications there are 25,000* dealerships in India. These are affiliated to respective OEM vehicle manufacturers. A dealership primarily operates in a 3S model, where 3S stands for sales, service and spares.

Based on the vehicles sold, the dealerships are broadly divided these into two vehicle segments: 1) passenger and commercial vehicle dealership; and 2) two and three-wheeler dealership. To understand the manpower requirement in these two segments of dealerships we first need to understand the current structure and composition of this sub sector.

Figure 22: Organizational design of a sales dealership



Source: EY Analysis of primary survey data

- **Passenger and commercial vehicle (2018)**
  - The number of dealerships for four-wheeler segment, including passenger vehicle (PV) and commercial vehicle (CV), approximately equals the dealership numbers of two and three-wheeler segment. For both these segments the numbers are approximately 12,500 dealership for each segment.
  - Each of the PV and CV segment dealerships employ 200 personnel per dealership.
    - The sales and spares segment employees, 60% of the total employment.
    - The remaining 40% belong to the service segment.

- **Employment projections for two and three-wheeler segment (2018)**
  - The two and three-wheeler vehicle segment dealerships have a hierarchy of channel. To enhance the reach of the vehicle across a geography, this segment has the following channels:

- a) Main dealership:
  - The dealership authorized by the OEM is referred to as the main dealership. They contribute towards 40% of the vehicle sale, through the main dealership outlet
  - Each main dealership employees 75 personnel, of which 60% belong to the sales and spares functions and remaining 40% belong to the service function
- b) Sub-dealership:
  - Main dealership sets up sub-dealer outlets, in order to maximize its reach to potential customers
  - There are on an average five sub-dealers for every main dealer
  - Each group of sub-dealers, attached to a main dealer, sells 60% of the vehicles
  - Each sub-dealer employees 25 people

7.2.4. Incremental human resource requirement

Based on inputs from FADA and EY's research and analysis of data from industry archives, websites, and publications there are 25,000* dealerships in India. These are affiliated to respective OEM vehicle manufacturers. A dealership primarily operates in a 3S model, where 3S stands for sales, service and spares.

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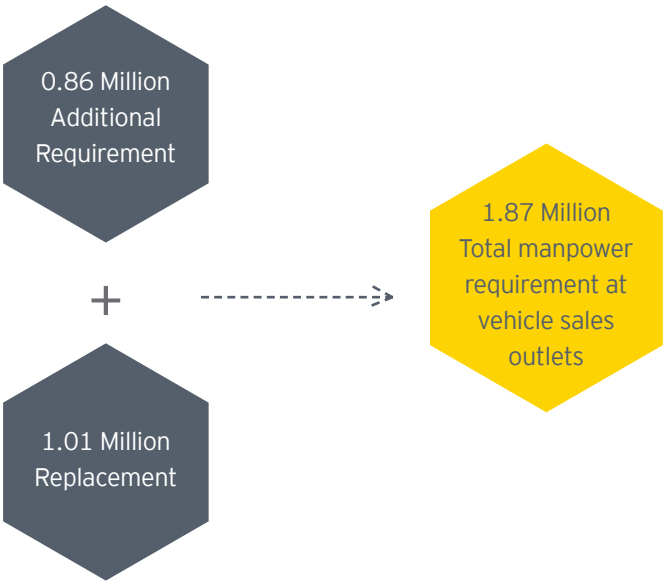
Table 11: Vehicle sales and service year-on-year employment (Employment in Million)

Employment in Million	2018	2019	2020	2021	2022	2023	2024	2025	2026
Employment in PV and CV dealership	1.50	1.34	1.36	1.42	1.49	1.58	1.71	1.82	1.93
Employment in two and three-wheeler main dealership	.56	.49	.50	.53	.56	.59	.65	.68	.72
Employment in two and three-wheeler sub dealership	.94	.81	.84	.88	.93	.99	1.08	1.14	1.21
Total Employment in sales		3.0	2.64	2.70	2.83	2.97	3.17	3.43	3.64
Additional Requirement		-.36	.07	.12	.14	.20	.26	.21	.22
Replacement		.11	.11	.11	.12	.13	.14	.15	.15
Total Requirement		**-.26**	**.17**	**.24**	**.26**	**.33**	**.40**	**.35**	**.37**

Source: EY analysis

Table 12: Department/Job role wise employment by 2026

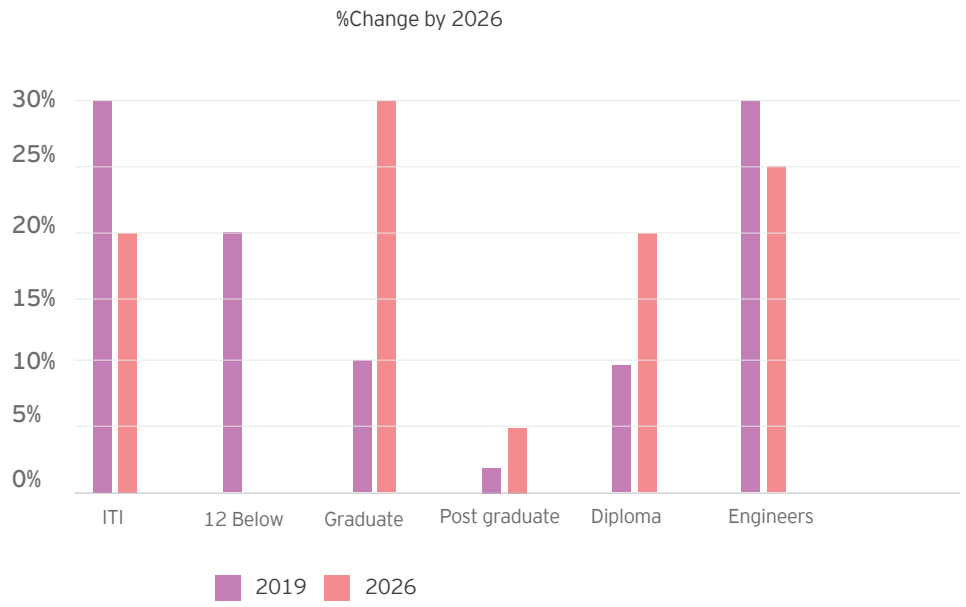
Department/Job Role	Employment by 2026 (000)
General Manager	37-47
Senior Manager Executive	37-47
Manager	37-47
Assistant Manager	130-140
Team Lead	271-281
Sales Consultant	785-795
Accesory Manager	37-47
Executive	84-94
Accesory Fitter	177-187
Exchange Manager	37-47
Executive	37-47
Inventory Manager	37-47
Paid Delivery Incharge	37-47



Source: EY analysis

7.2.5. Impact on jobs and skills

Figure 23: Change in job roles 2019-2026

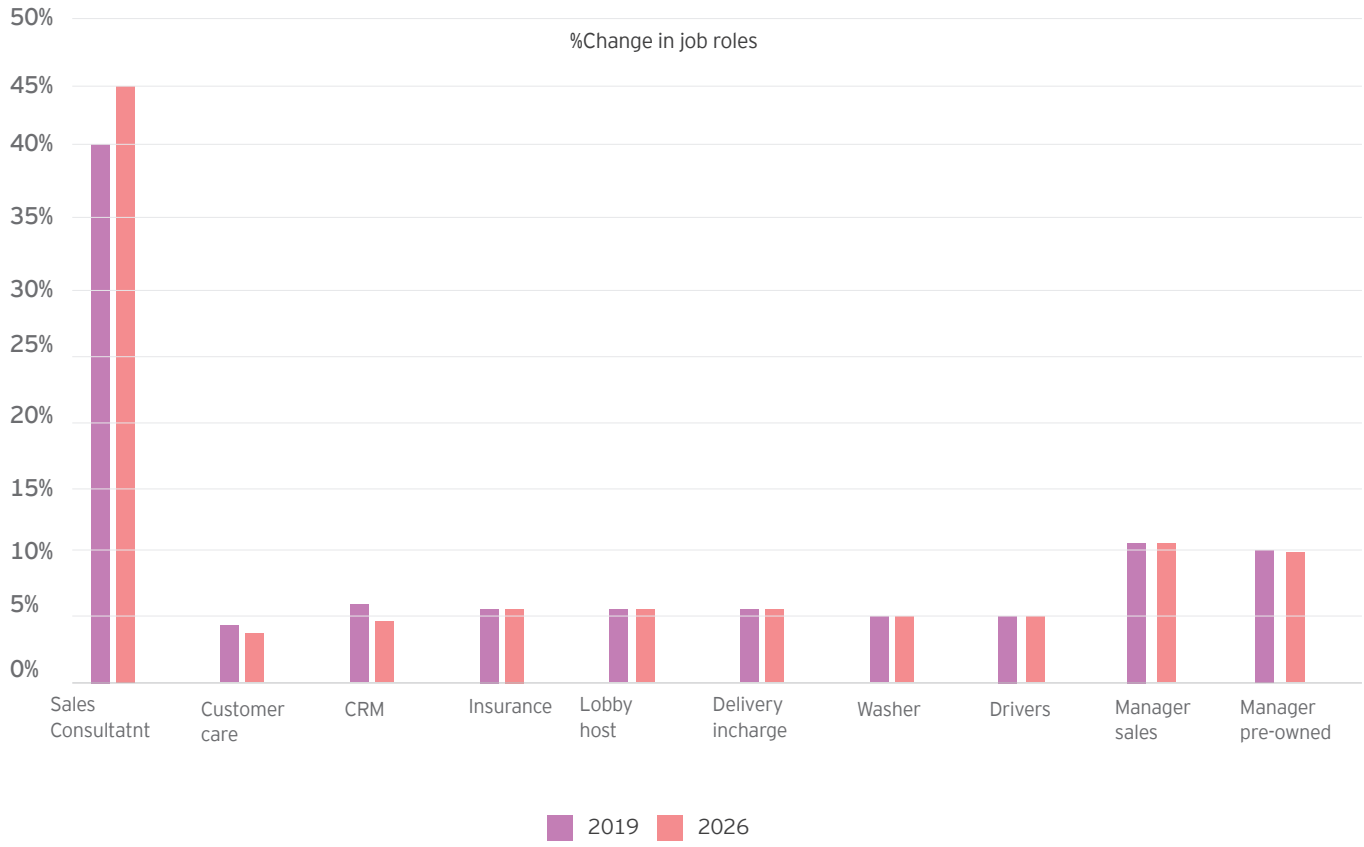


Source: EY analysis

Function wise qualifications

- Given the changing requirements of the customer, the workforce at dealerships will undergo a qualitative change. The manpower will need to be highly effective in the function of sales, be knowledgeable about the product and technology and efficiently manage customer interactions. Overall, a more customer centric approach would need to be displayed by the manpower.
- With an increase in sales of luxury segment vehicles, a much higher level of technical and customer interaction skills needs to be displayed, with professionals having good presentation and communication skills.
- By 2026 employees will be required to master new skills like digital marketing, virtual reality, data analyst, etc. and be fully equipped with the knowledge about new technologies being introduced in automobiles of the future.

7.2.5. Impact on jobs and skills



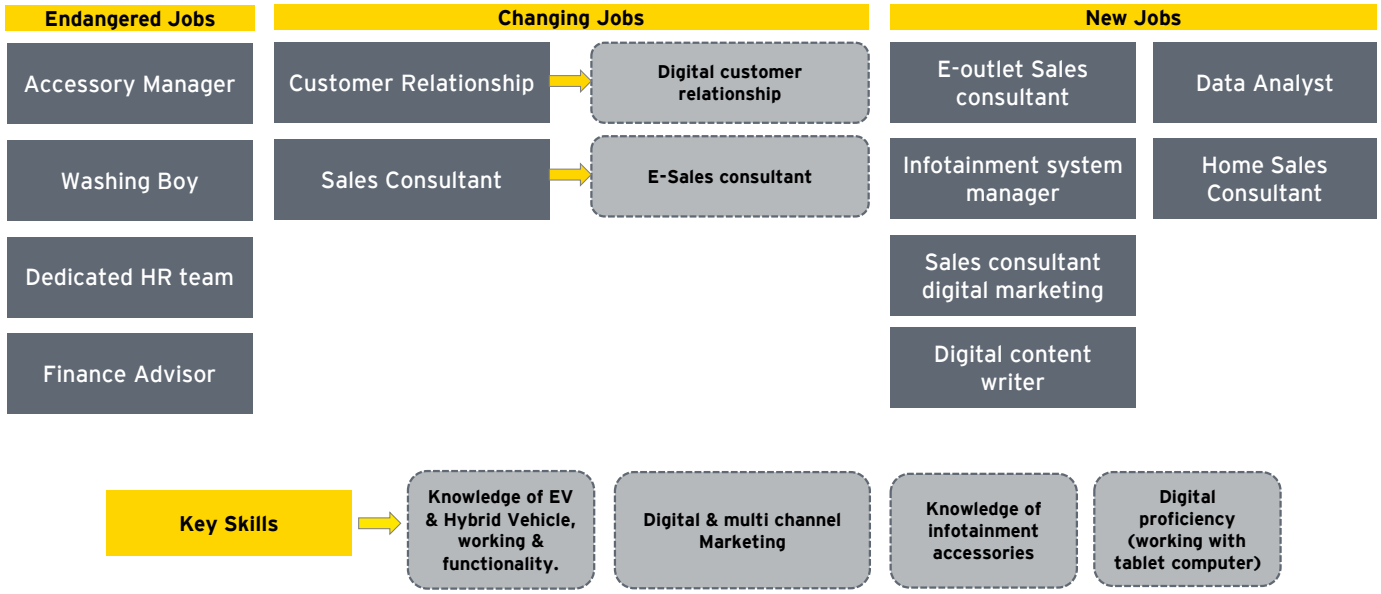
Source: EY analysis

Functional classification of workforce

- The role of the sales consultant will increase. The primary reasons for this, is the enhanced customer expectation for a more customized interaction. The amount of time demanded by the customer will also increase and so will the quality of discussion that is expected by the customer. The sales consultant must now be able to gauge the customer's needs and not recite a prepared sales pitch. The modern sales consultant must have a high degree of communication, sales and negotiation skills, an attitude for customer service, awareness of new technologies and norms and should also be able to use modern equipment like tablets to access and demonstrate information as demanded by the customer. A similar increase can be seen in the customer care and CRM. Both these roles will become increasingly critical.

Key job roles evolution

In this section of the report, we focus on the following key job roles, based on their importance to the sub-sector and the degree to which they are expected to change or evolve due to the aforementioned trends.



Source: EY analysis

a) **Call center executive:** The current standard or understanding of customer relationship marketing is that of providing a call center service. Most first level inquiries are made at this level, although online inquires have been growing in number. They are also the first line of engagement when customers want to check on their orders, make dealerships appointments, check on the availability of vehicles, etc. At present the call center executives only provide basic information about the vehicle and dealership. However, in the future, they will be expected to solve customer problems and act as a touch point for convincing potential customers to visit the dealership. To fulfil this requirement, the call center executive must take on some aspects of the sales consultant and engage with the customers and explore their needs. The need of the present market is to develop customer relationship and life cycle management capabilities based on data collected from a wide variety of online and offline sources – the call center executives will act as one of these sources.

b) **Data analysis and CRM (customer relationship marketing):**

- Continuing from the data collected from the call center and other sources, the data analysis function analyzes the data and develops targeted marketing strategies. It can lead to providing differentiated treatments to customer segments based on their unique behaviors and preferences. The same must be used to generate more walk-ins or leads that are followed up by ground staff. The sales consultant must be informed beforehand by the data analysis function of the customer walking into the dealership. It will translate into a better reception of the customer, a more satisfied experience and a higher percentage of "inquiry to sales" conversion.
- The CRM function is an addition to the data analysis function. The customer's experience begins at the digital environment. The relationship with the customer should also begin at this stage. By providing information, experiences (visual, audio) and enticements, the customer must be converted to a walk-in. The experience beyond the walk-in (whether it converted to a purchase or not) should be continued through online touch points (emails, social media, newsletters, more offers) and offline touch points (phone calls, take home test drives, paper invitations, other services).
- Skills required:
  - Handling social media and other customer centric touchpoints
  - Basic customer data collection techniques such as surveys, focus groups and interviews
  - Basic data analysis techniques and focused software

- Ability control and maintain many customer touch points both online – such as social media, web browsing data, mobile apps, etc.
- Advanced data analysis techniques such as customer profiling, structural equation modelling, etc.

c) Sales consultant:

Once the customer walks into the dealership, the sales consultant is the one responsible for converting the sale. At present, the sales consultant relies on a prepared script, a cursory understanding of the vehicle and a limited understanding of financial and servicing options. Faced with a prepared and internet savvy customer, the modern sales consultant must engage with the customer's needs and desires and present the vehicle as a solution to their problems. The sales consultant must also tailor their speech or sales pitch according to the customer. It requires the ability to gauge the customer's background, thinking and mannerism to react accordingly, giving the customer the impression that he or she is understood and therefore their needs will be better taken care of. The sales consultant must also match the customer's ability to accrue and explore information from the internet. At present, sales consultants are often caught giving arbitrary information when encountered with a question they do not know the answer to, leading to an embarrassment and loss of the customer's trust. The modern sales consultant should be well-prepared and well-informed, have the ability to accept ignorance of information in case the query can't be resolved, diligence to look it up through hand-held or other devices and come back to the customer with a satisfactory answer. To deliver such a service, the modern sales consultant must have strong communication ability and be able to persevere gracefully under pressure.

- Skills required:

Communication and negotiation skills

- Ability to access and use information tools and sources, e.g., an internet connected hand-held device
- Ability to gauge a customer and adapt approach accordingly
- Understand nitty-gritties of the vehicle, including new features such as safety and infotainment devices
- Basic understanding of financing and Insurance options
- Liaising with data analysis and CRM departments to better understand and prepare for customer
- Read and profile customer from appearance and spoken cues
- Handle devices such as virtual reality, 3D displays, and touch screens
- Deeper understanding of financing and insurance options

d) HR and recruiters

The current HR function is almost non-existent in the dealership sales sub-sector. However, to prevent the high rate of attrition and to attract individuals with more communication and soft skills, the HR function must develop strategies for creating job attractiveness, job satisfaction and a structured career progression path. The present sales consultant position at dealerships is considered unglamorous (unlike the car salesperson persona in the west), is filled by applicants barely crossing over from the blue collar to white collar segment and holds no future career progression. Most applicants see it as a stepping stone to better jobs. HR must counter these factors to develop a cadre of sales consultants able to match and surpass the communication ability, knowledge and understanding of the modern customer. The HR function must also prepare to develop modern job descriptions for existing job roles to adapt according to the trends in the industry. Therefore, this function is affected by all trends of the industry and must be cognizant of them all.

Vehicle service

Around 40% of the labor employed in vehicle servicing is usually self-employed or working in a roadside garage. With the electrification of vehicles, the unorganized service sector will be impacted the most.

08

The automotive servicing industry will continue to grow as the sales of vehicles increases. Owing to limited warranties provided by the OEMs, the unorganized portion of the sector is sizeable and continues to grow alongside increasing vehicle sales.

Vehicle Service		
▶ Total vehicle servicing market is estimated at INR 54,000 crore including labor & spare.	▶ Total organised dealers & sub dealerships : **87,500** ▶ Total organised PV & CV dealerships : **12,500** ▶ Total organised 2WE & 3WE dealerships : **12,500** ▶ Total organised 2WE & 3WE sub dealership : **62,500**	▶ **3.12 million** total employment in the service industry. ▶ **2 million** people employed in OEM authorised service centre as of FY2017 ▶ **3.05 million** people employed as basic mechanics in roadside garages

Source: EY analysis

At present, the service penetration of most major OEMs is only 50-52%[55] with the balance provided by the unorganized sector. Research suggests that only a third of the vehicles go back to the OEM workshops post warranty. Remaining 65% of the cars prefer to go to the unorganized sector that provides customized and closer to home service.

Vehicle servicing in India happens from three primary channels:

1. Authorized service center (OEM Affiliated)
2. Organized independent garages
3. Road side garage

▶ **Share of vehicles serviced by segment and service channels**

Table 13: share of vehicle service by segment and service channels

Type of service center[56]	2WE	3WE	PV	CV individual	CV fleet
Authorized service center (OEM affiliated)	35%	15%	33%	10%	10%
Organized independent garages	1%	-	7%	30%	50%
Road side garage	64%	85%	60%	60%	40%

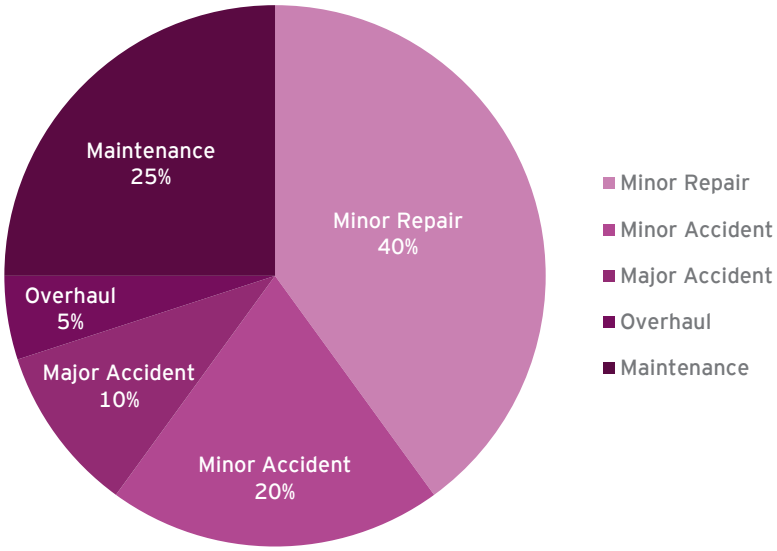
Source: EY analysis

[55]Capgemini
[56]ACMA Blue Book

- **Share of vehicles serviced by repair type and service channel**

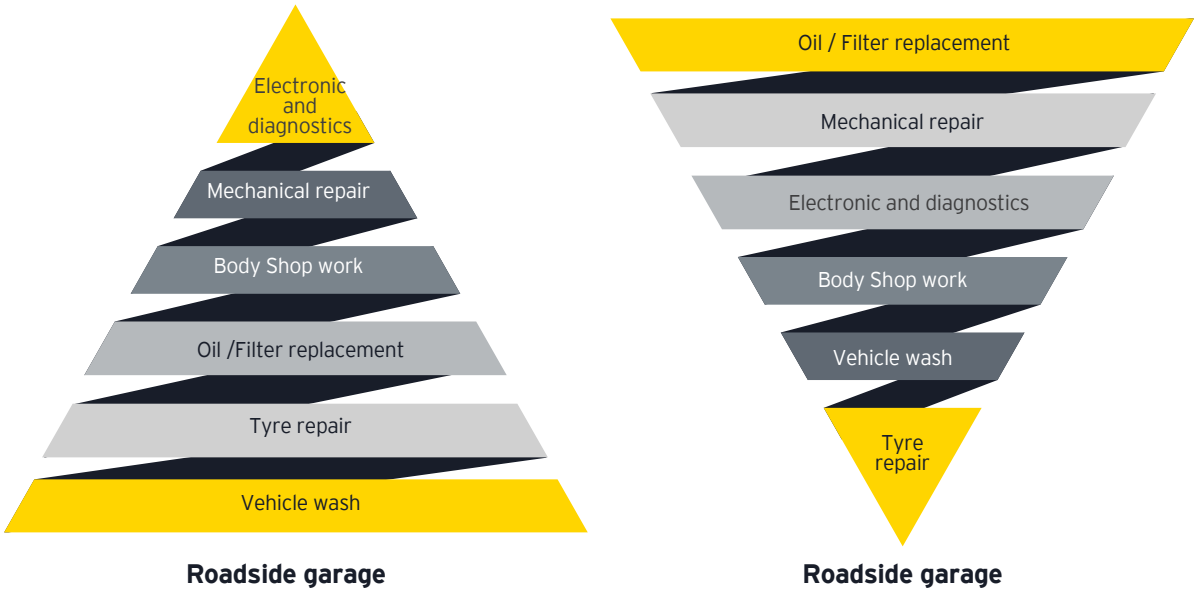
Based on revenues, the unorganized sector has the majority share of service market, at 53%, while the organized single brand segment has 43% of the market and organized multi brand segment is at 1%.

Figure 24: Share of vehicle service by repair type, India



SOURCE: ACMA blue book 217

- **Vehicle repair type by service channel:** The split of services across roadside garages and authorized service centers, is essentially based on the technicality of the issue. Customers are usually seen to approach the authorized service centers for most of the work pertaining to vehicle performance diagnostics, mechanical repairs and electrical issue. Whereas, basic work like car washing, tire puncture repair, etc. are serviced at the road side garage.

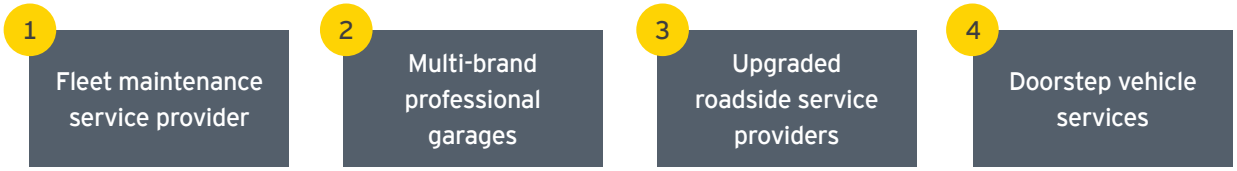


Source: EY analysis

[57] https://yourstory.com/mystory/5fe5b008f7-a-snapshot-of-car-servicing-industry-in-india
[58] EY Analysis

8.1. Future of the servicing sector

Like most other functions within the automobile sector, the servicing function has also developed new models and offerings to keep abreast with technological and market developments:



Source: EY analysis

a. Fleet maintenance service provider: With around 7.8 million commercial vehicles on road and likely to grow by 10%, to 15.6 million by the year 2025[58], 90% are independently owned and 10% as fleets. Currently 50% of the fleet is being serviced in-house. In the future, dedicated fleet management services will be deployed where services will be billed as per distance travelled. This will create new job role of fleet manager/liaising officer, at the client fleet company, who will communicate and coordinate with the fleet maintenance service provider.

b. Multi-brand professional garages: Falling within the organized classification, these service centers, provide servicing to vehicles, across multiple brands, under the same roof. They do so by either integrating independent service providers under one brand or through a franchise model.

c. Upgraded roadside service providers: OEM authorized service providers hold a monopoly over servicing of their vehicles, while the vehicle is in its initial warranty period. Post the enactment of the bill on Right to Repair (expected time is less than a year) OEMs will be required to provide all the information about the vehicle, to independent service providers as they provide to their authorized dealer shops.

d. Doorstep vehicle services: Vehicle servicing can now be ordered at one's doorstep through mobile applications. Door step vehicle service providers act as aggregators for independent service providers, connecting them to customers through mobile and web-based applications, coordinating payments, and ensuring transparency and uniform service quality.

8.2. Trends impacting skill requirements

- The servicing sub-sector is affected by the global market and technological trends. As new product variants such as hybrids and EVs come into the market, servicing workshops will be required to understand the technology and effectively repair or rebuild parts of the new technologies. The modern customer's access to information also means that the customer will be more informed about the process and will have the option to go to competing service providers. In this new scenario, the workshops need to upgrade not only the technical prowess of their personnel but also communication and marketing skills.
- With the advent of shared mobility providers, the demand for servicing has also gone down. As cab aggregators disrupt the market in tier 1 cities, the usage of cars has come down considerably. Considering that the shared cab, through each vehicle, fulfills mobility needs of multiple customers, reducing the overall wear and tear of vehicles per passenger. Since the overall usage of owner driven vehicles has come down, the urgency of keeping a well serviced car at home has been reduced. Therefore, the focus of service providers is also shifting towards cab services. Service workshops must now coordinate with shared mobility providers to get long term or short-term contracts to service the heavily used cab vehicles. They must also develop new means of marketing and connecting with potential customers, developing new inroads through a structured customer relationships initiative.
- The car repairman is no longer called a mechanic, he is called a technician. The reason for this change is essentially due to the evolution of the job. Whereas previously the car mechanic would look under the hood of the car, fiddle with the knobs and assess the working of the engine and other parts; the car technician of today hooks the car to a computer and with the aid of

diagnostic tools, is able to identify the issue accurately. Further, regulations by the government are aimed at ensuring that issues related to computer controlled auto-components like steering wheels, airbags, brakes, windows, mirrors, etc. are to be diagnosed by vehicle diagnostics and testing tools.

Some of the trends that have been increasingly seen in the service function of vehicles, has created a definitive need for a higher level of skilled manpower, pertaining to:

(1) Mechatronics

(2) Vehicle electrification and onboard electronics

(3) Modern marketing

a) Mechatronics

Mechatronics is the multi-disciplinary field combining mechanical and electrical systems. This field is very significant in the automotive industry, since increasingly automobiles will have more and more electronic components and controls in the predominantly mechanical bodies. In the case of EVs, the major portion of the car will be electric.

At present, the unorganized sector constitutes more than 60% of the servicing industry[59]. These include independent and private garages, small repair-workshops and roadside repair and assistance providers.

The new mechatronics-based tools will also come at a higher price and demand better maintenance. Small workshops and roadside repair garages might not find it financially and operationally viable to own and maintain such equipment. These machines will also be power dependent; therefore, a proper setup and backup will be required for them. They will also demand a better understanding of electronic displays and readouts. As such, the advent of mechatronics makes it more feasible for larger, more organized setups to adopt it, rather than the independent smaller unorganized service providers.

Furthermore, diagnosing, repairing and calibrating with the use of mechatronics, will require proper training and skills such as programming a computer, reading and understanding computer generated reports, using computer systems to control mechanical parts, etc. Mechanical systems such as braking, transmission and steering systems are increasingly controlled by computers and electronic systems. Therefore, it would become imperative for existing personnel to become skilled in understanding the technology and handling of electronic systems in order to perform the functions of servicing.

b) Vehicle electrification and onboard electronics

With penetration of EVs into the market, the servicing function will have to gear itself for the changed technology that would impact vehicle repair and servicing. 65% of the ICE vehicles60 utilize the service center for an oil change, thereby opening a window of opportunity to sell other services. However, with EVs not requiring an oil change every 5,000 kms, the frequently visiting customer would not be a periodic occurrence

EVs would therefore make some of the jobs obsolete or redundant and others requiring a higher degree of skills, like electronics, computer programming, understanding batteries and electric powertrains. An EV only dealership may focus to provide services in tire repair and replacement, wheel and suspension assemblies, collision repairs and systems diagnostics.

c) Modern marketing and data analytics:

With the advent of onboard electronics in vehicles, it has become easier to collect data on driving and vehicle usage behavior of customers. However, online data collection has been around for years and modern workshops must use it to develop better understanding of their customers.

The modern customer is more informed and has access to more options when it comes to servicing providers. To court such a customer, the service workshops must use advanced marketing options such as online touchpoints, relationship marketing and customer data analytics to create targeted offerings.

- **Predictive analytics:** Modern vehicles will have electronic sensors in the system that can automatically detect a malfunctioning component or system and notify the driver, owner or even the dealership from where the car has been purchased. The service dealership can then automatically check its records, diagnose where the part needs to be repaired or replaced and send a message to the customer alerting them of the need for servicing.
- **Advertising:** The modern customer spends more time on the internet than on traditional media. Advertising on social media outlets will therefore be more productive, especially when targeted towards specific segments of the customer base. Such processes require customer data collecting and data analysis. Dealerships need to hire specially trained personnel or agencies that have expertise in such processes. Therefore, designing unique servicing offerings and promoting them will become key to the success of service dealerships.

[59] Live Mint

[60] Wiley online library

- **Relationship marketing:** The focus of service having shifted to the customer, long term relationships with them will become the only way in which the workshop can expect continued patronage from the customer. This would require expert personnel in the back office, who understand these algorithms, requirements and can package offerings. The front office will also require new skills like handing the CRM software, soft skills, effective communication and negotiation skills. The modern customer can be expected to remain attached to the workshops only if their experience of dealing with the workshop is delightful, not just on the basis of having been provided basic service.

8.3. Demand analysis

The demand for vehicle servicing will continue to increase with the increased sales of vehicles. With the arrival of trends such as EVs, shared mobility, and growth of the luxury vehicle segment, demand for vehicle servicing will witness a steady increase in numbers, but more importantly will evolve into adapting new format, such as electronic diagnosis, fleet management/ maintenance and model specialized services for the luxury segment.

8.3.1. Departmental functions of service dealership:

The core functional areas at a service dealership will witness some changes in the requirements of workforce. Close to 70% of the workforce in an OEM authorized dealership is deployed in the workshop and body shop. While the workshop will witness a downtrend in manpower requirement, body shop will have an uptrend to balance it out. The downtrend at workshop, as per the analysis in the earlier section, can be attributed to higher productivity due to use of digital diagnostic tools and a lesser requirement of maintenance in modern cars.

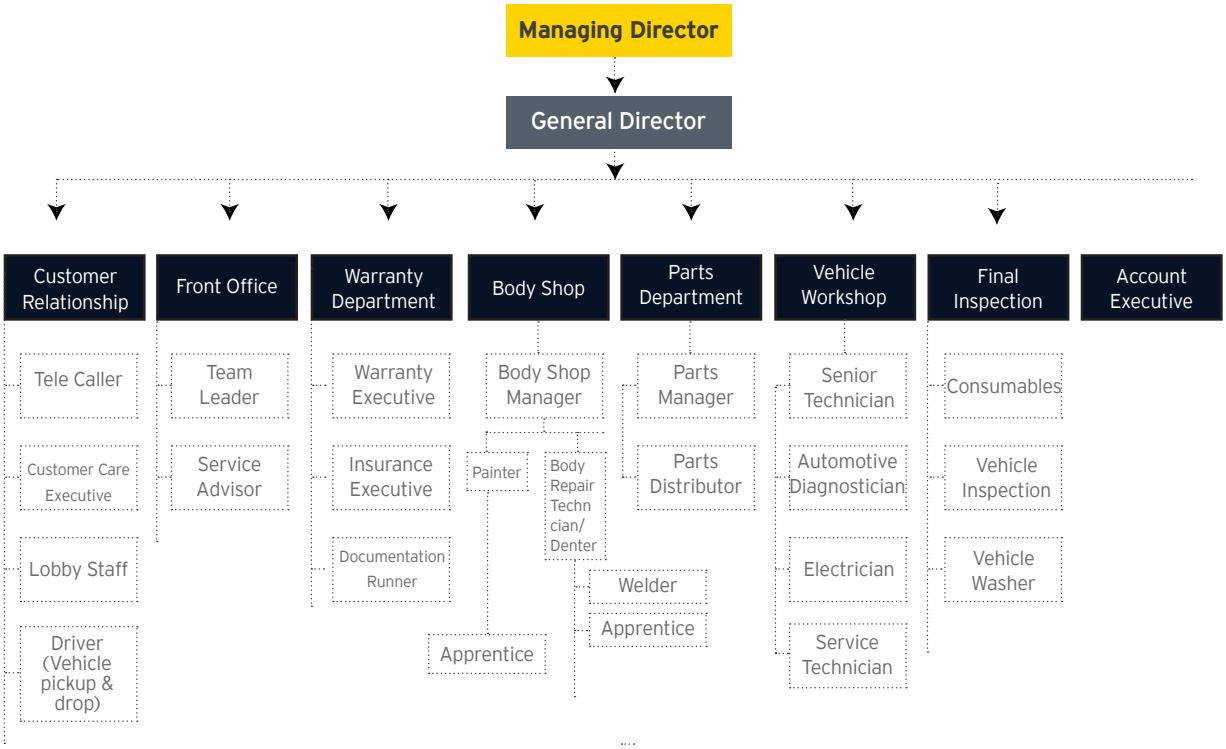
Table 14: Typical OEM authorized service dealership changing workforce distribution

SN	Function(departments)	Percentage of workforce deployed 2019	Change in workforce distribution 2030
1	Vehicle workshop	38%	Down
2	body shop	30%	Up
3	Front office	9%	Same
4	Customer relationship	7%	Up
5	Parts department	6%	Down
6	Final inspection	6%	Same
7	Warranty and accounts	4%	Same

Source: EY analysis

To understand the various functions at a service dealership, research has indicated a typical organizational structure followed at the dealership. This structure in also indicative of the possible growth path across roles.

Figure 25: Organizational structure followed at dealerships



Source: EY analysis

To be able to map service dealerships, it is pertinent to understand the current overall manpower map at service dealerships, both for authorized and unorganized servicing providers

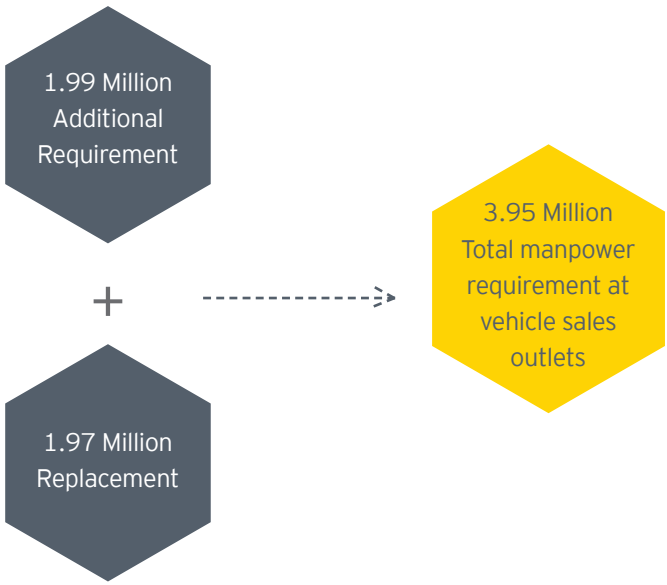
8.3.1. Incremental human resource requirement

Employment in Million	2018	2019	2020	2021	2022	2023	2024	2025	2026
Authorised Service center	2.0	2.12	2.22	2.29	2.36	2.45	2.55	2.66	2.78
Road Side Mechanics	3.05	3.24	3.39	3.50	3.61	3.73	3.90	4.07	4.26
Total vehicle mechanic	5.05	5.36	5.61	5.79	5.97	6.18	6.45	6.73	7.04
Additional Requirement		.30	.25	.19	.17	.21	.27	.28	.31
Replacement		.21	.22	.23	.24	.25	.26	.27	.28
Total Requirement		.52	.47	.42	.41	.46	.53	.55	.59

Source: EY analysis

Table 15: Department/Job role wise employment by 2026

Department/Job Role	Employment by 2026 (000)
Service Technician	760-910
Service Electrician	300-350
Service Advisor	300-350
Customer Care	230-270
Parts Manager	130-150
Tool Room Incharge	100-120
Cashier	130-150
Denter	490-600
Painter	390-470
Washing Supervisor	130-150



Source: EY analysis

8.3.2. Impact on jobs and skills

Figure 26: Percentage change in workforce qualification (2019-2026)

Source: EY Analysis

a) Volume change in key job roles (2019-2026)

Given the changes in the servicing scenario, based on changing requirements and new models of providing these services, definitive changes are slated to occur with respect to manpower.

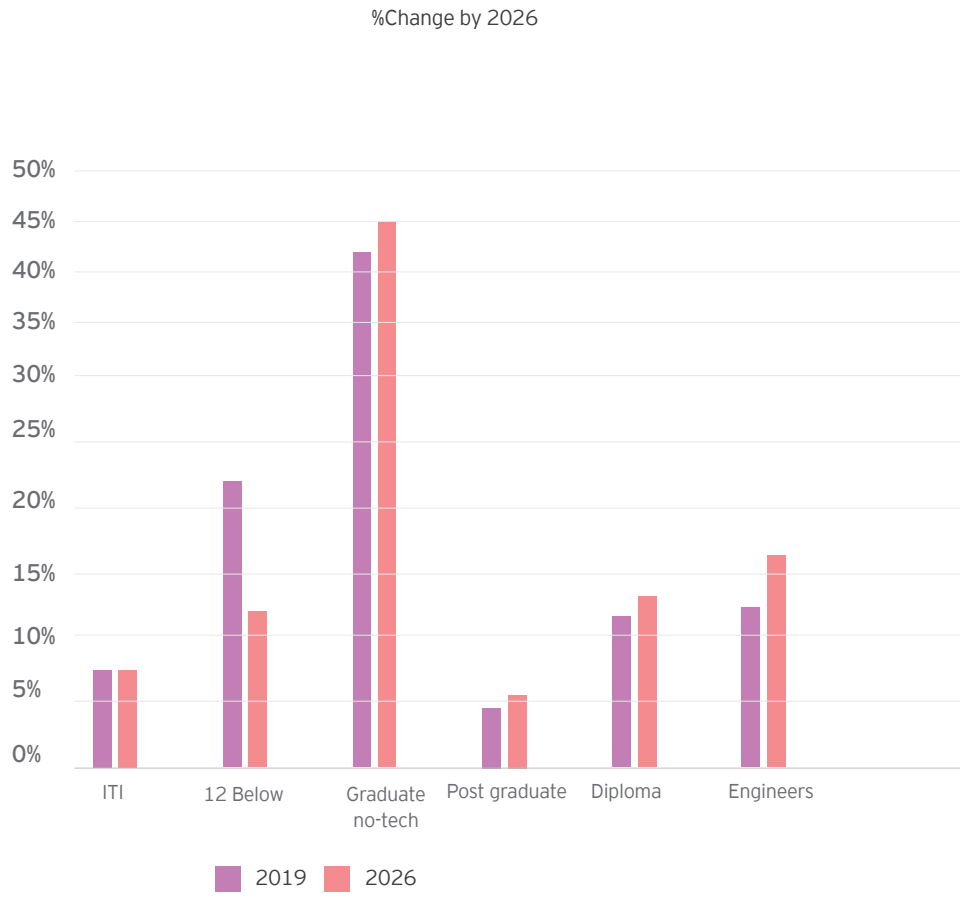
- Service technicians might reduce by 10%[61] due to electrification and increase of onboard electronics.
- Service electrician will see an increase of 10% due to heavy use of automotive mechatronics.
- Body shop job roles will increase as the prominent work at service dealership would be collision repair and vehicle customization.

[61] Bureau of energy efficiency

b) Percentage change in workforce qualification (2019-2026)

The number of workers with a threshold of 12th standard or below will undergo a steep decline, whereas the number of workers trained at graduate, post graduate, diploma and engineering degrees will increase. This change is consequent to requirement of a different skillset, which is a function increasing complexity of parts and high use of electronic components with mechanical parts.

Figure 26-: Percentage change in workforce qualification (2019-2026)



Source: EY Analysis

c) Key job role evolution

Globally 97% [62] of auto technicians can't work on electric vehicle and the remaining three percent will bw employed by OEMs

Some of the key job roles mapped for the servicing function would be new roles, while others will undergo a considerable change in required skillset

[62] Institute of the Motor Industry (IMI)

New job roles

Battery technician

- Work with high voltage technology
- Ability to use proprietary diagnostics tools & battery testing equipment like voltmeter.
- Should have knowledge of electrical & chemical engineering.
- Should be able to repair or replace battery packs in hybrid & electric vehicle.

Electric Vehicle Technician

- Fundamentals of the operation, Electrical and Electronic systems diagnosis & repair of electric and hybrid vehicles.
- RCL analysis - Mathematical computing and analysis tools knowledge (Matlab, MathCAD, Excel, LabView etc)
- Understand & working of core EV automotive electrical concepts like power electronics, embedded systems, battery management systems, peripherals and harness

Predictive Analyst

- Analysis of past service data & driving patterns to predict the vehicle condition, service requirement. This would help the service centre know when to contact the customer.
- Ability to write SQL queries & work on data analysis software's like Hadoop, SAS, etc.

Key skill sets

Key Skills → Computer Diagnostics | Error code reading & troubleshooting skills | Work with the high-voltage technology | Ability to read and operate through manual | Understanding of basic electronics

Changing jobs

Auto electrician	Auto expert electrician
Paint technician	Advance paint technician
Customer care executive	Digital marketing expert

Endangered jobs/skills

Engine Repair Technician | Service Technician | Clutch Repair Technician | Sanding & Primer Jobs

Source: EY Analysis

- **Key job roles**

Service technician: Automotive service mechanics, now referred to as service technicians have the primary job of inspecting, maintaining and repairing vehicles. The skill required for the role include:

- Identify mechanical problems, by using computerized equipment
- Understanding of basic electronics
- Working with high voltage technology
- Understanding of alternative fuels and how the powertrain changes with it
- Complete certifications by OEM on various vehicle technologies like, traction motor repair, battery and connected features of the vehicle
- English reading and writing skills which will able them to read and operate through manual
- Soft skills to be able to communicate with customers

Road transport

Road transport, also referred to as logistics, is the lifeline of an economy, since the carriage of goods from one destination to another, affect regional and industrial development. The Indian logistics sector is growing at a CAGR of 10.5% and is expected to reach approximately US$215[63] billion by 2022. As the Indian economy continues to grow, this sector will grow alongside.

09

[63]Economic Survey 2017-18

It has been boosted by initiatives like Make in India aimed to support the manufacturing industry and is expected to directly impact the logistics sector. Also, with MoRTH developing better roads across the country with large-scale infrastructure projects such as Bharatmala Pariyojana, the logistics industry is being made more efficient and therefore a large contributor to the overall development of the economy.

It is well recognized that the road transport segment is very much necessary for the economic development. An analysis of the contribution of gross value added by the transport sector shows that maximum value added from the sector is generated from road transport. ~60% of the gross value addition of the transport segment was from road transportation[64].

The structure of the road transport sub-sector is highly unorganized in India. This sub-sector is broadly comprised of transportation services, intermediaries (transport contractors/booking agents) who offer haulage services, brokers supplying equipment, drivers and the consignors constituting the ultimate demand for the services. The key players are:

1. Transporters: These are the trucking companies that typically own a fleet of trucks, often warehouses and terminals as well.

2. Truck operators: They are individual owners, typically owning one or very small fleet of trucks. On account of the low entry barrier there is a large presence of a number of operators that has resulted in the fragmented and unorganized industry structure.

3. Intermediaries: The intermediaries mainly comprise of booking agents and brokers. Booking agents are firms or persons who accept and store goods, both parcels and bulk and arrange for their movement through operators. These booking agents negotiate with and on behalf of users with the transporters or truck operators. On the other hand, a broker normally represents the supply side, i.e., truck operators, and though in the past there have been booking brokers who have represented user interests for a commission.

The road transport sub-sector analysis in this report comprises of evaluating the:

- Employment and Skills gap associated with driver demand
- Employment associated with fuel pump stations
- Employment forecast based on EV charging infrastructures

In the following section the skill gap in the aforesaid three segments is explained in detail:

9.1. Employment and skills gap associated with driver demand:

Drivers account for almost 50% of employment in the automobile sector. In India the demand for drivers will continue to be higher than the supply owing to India being the second most populous country in the world complimented by a fast-growing economy.

Till the time autonomous vehicles become a universal reality, drivers will be in demand. The demand for drivers is mainly arising from two segments:

1. Driver demand for commercial vehicles

2. Driver demand from cab aggregators

Given the difference in the type of work, classification of labor and emerging trends in these segments, we will present our study of the two segments separately.

[64]Employment Potential of the Road Transport Sector. CII accessed from http://www.ies.gov.in/pdfs/CII-Employment-sector-dec15.pdf

9.1.1. Driver demand for commercial vehicles

There were 750 drivers/1000 trucks in 2012 and the number is estimated to decline to 450 drivers by 2022 if the issues faced by drivers are not addressed.

While the logistics industry is on a growth trajectory, it is faced with an acute shortage of skilled drivers to meet the present demand and given the projected growth of the industry this demand will continue to increase. Currently there are 0.6[65] drivers per vehicle. This shortfall of drivers is owing to the challenges faced by the drivers in this segment such as lack of proper career growth plan, low remuneration, lack of work-life balance resulting from strenuous periods of work followed by large periods of idleness. These factors, among others, make it an unattractive career and life choice.

In this scenario of acute driver shortage, the existing drivers are being challenged by emerging technologies and are being pushed towards upgrading their skills to adopt these technologies to remain a part of the workforce.

In the future, every driver will be expected to have one complementary skill in addition to driving. These complementary skills – management or hospitality related – will help in creating a new generation of drivers with structured career paths, making this profession aspirational.

With fleet companies evolving due to dynamic load sharing and the use of mobile applications for route optimization and job distribution, this new generation of drivers will have to upgrade their skill levels to remain functionally viable.

The primary survey of the industry executives led us to the following insights on key aspects of driver demand:

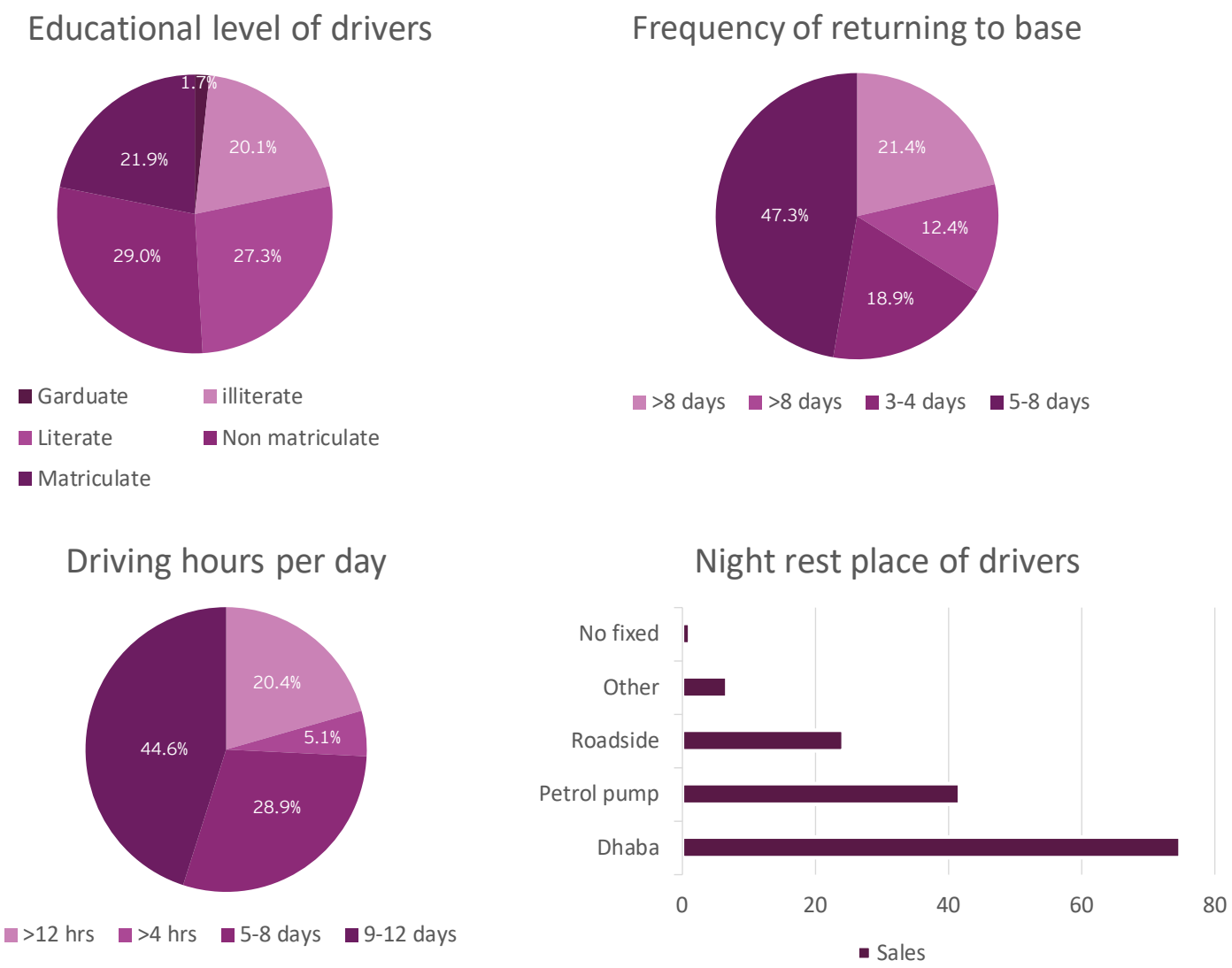
- **Sources of commercial drivers:** At present the new drivers are generally coming from an agricultural background where lack of any gainful employability and its cyclic nature forces them to leave farmlands and look for alternative employment options. One of the major sections of such workforce join the commercial driving segment.
- **Our primary interaction with sector skill council suggests that** most of the new generation of drivers have migrated from Assam, West Bengal and Jharkhand. Punjab, a relatively prosperous state, is not producing drivers as the third generation drivers are now becoming entrepreneurs and own fleets instead of driving themselves.
- **Shortfall in supply of drivers:** There is an approximate shortage of 20% when it comes to drivers in this segment. In 1980, there were 1,350 drivers available against 1,000 trucks, currently there are 600-750 drivers for 1,000 trucks. By 2022, it is expected that the number will reduce to 480 drivers for every 1,000 trucks[66].
- **The reasons for the shortage of drivers are:**

The unglamorous perception of the job. Not much has been done towards enabling comfort of the drivers. Working hours are subject to spurts of long hauls followed by periods of idleness and no work.

- No proper career path or mechanisms to keep drivers engaged during the idle phases.
- Safety issues: When driving across states, there are no designated areas or systems for drivers to have healthy and hygienic boarding and lodging facilities.
- Lack of financial security as most drivers are contractually hired. Also, the drivers are provided no insurance cover for health, life, etc. considering the drivers are a susceptible group with respect to health issues, accidental deaths, etc.
- **New initiatives to address the issue of supply shortage of drivers:** At present the industry is visualizing a number of initiatives to mitigate the present shortage and to provide the drivers with basic security by hiring drivers on company rolls, extending insurance covers through government run schemes such as Pradhan Mantri Jeevan Jyoti Bima Yojana, Mediclaim, funding the education of driver's children and awarding ownership of truck after seven years of operation. Industry is also moving towards providing advanced features/technology such as sensors, cameras, Oracle Transportation Management (OTM) technology, AC driver cubicles, dedicated sleeping quarters, mandatory breaks between long stretches of driving, etc. with the aim of enhancing safety and comfort of the drivers.

[65] Primary Survey – Industry estimates
[66] EY Analysis on primary interactions

Figure 27: Statistics of education levels, frequency of returning to base, driving hours per day, night rest places of drivers



Source: EY Analysis

The industry accepts that the driver should be viewed as an important asset of the company. The vehicle as well the in-transit goods' worth economic and strategic value (to the destination or recipient) are in the driver's custody. Despite agreeing on this notion, much has to be done for the betterment of the working and financial conditions of drivers to inspire the drivers or their future generations to continue in this profession. Hence this sector is in a dire need of technological innovation, government interventions, and implementation of better industry standards.

9.1.2. Major trends impacting the commercial drivers

Transportation and logistics (T&L) segment of the commercial driving sub-sector is at an inflection point as the movement of people and goods is changing dramatically, driven by technology-based disruption and ever-present uncertainty. Navigating these uncertainties, taking appropriate risk mitigation measures and embracing digital disruption must become fundamental parts of a T&L company's value proposition.

1. New driver safety regulations focus on reducing driver fatigue:

- Electronic stability control (ESC) systems made mandatory for M2 and M3 buses from April 2019[67]while legislation from trucks is under discussion.
- AC cabins with two drivers so that other driver can takeover in case of emergency has been made mandatory for trucks from December 2017 to help reduce driver fatigue.

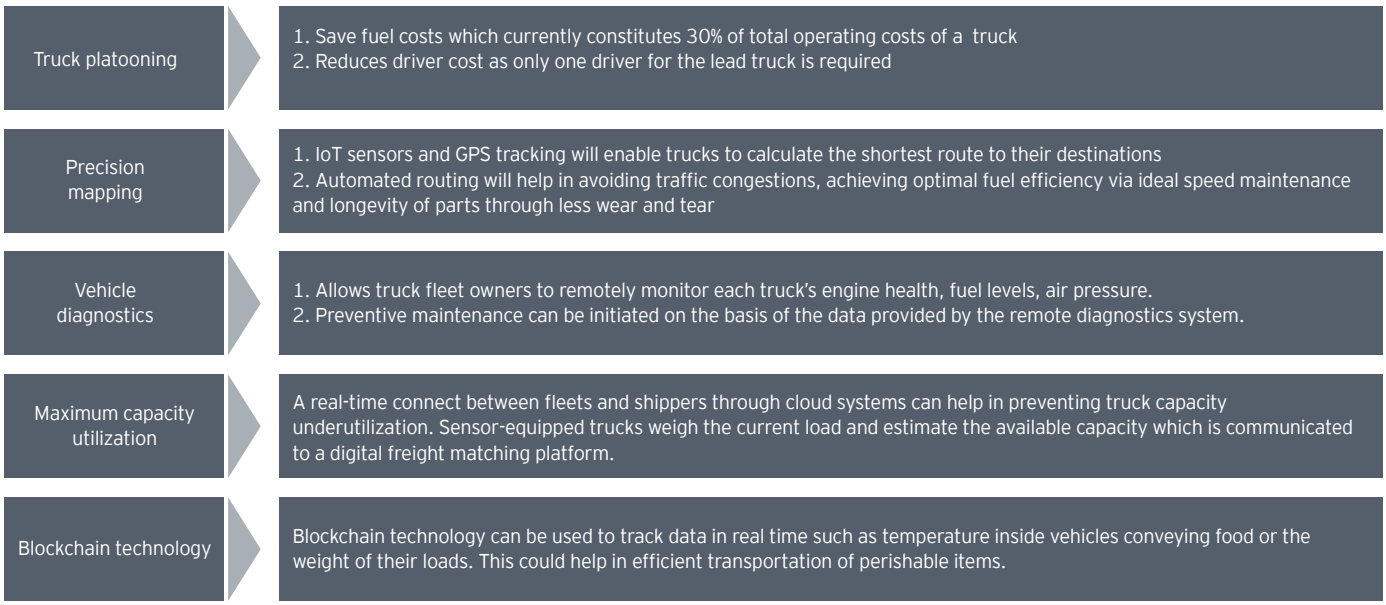
2. E-commerce continues to be a growth engine for commercial driving sub-sector: Enhanced connectivity and mobile penetration are key drivers of the rapidly expanding e-commerce market. India witnessed a CAGR of 53% for the period 2013-17[68]. E-commerce growth is accelerating, and commercial fleet management companies are positioning to capitalize on these opportunities.

3. Technology driven disruptions that commercial driving sub-sector needs to keep itself apprised of:

- Disruptive technologies present opportunities for improvement at all stages of the logistics value chain - from ordering, route optimization, payment and last-mile delivery.
- Use of shared economy and real-time load sharing technology, ensures optimal utilization of logistic capacities, reduction of prices, consequently increase in business.
- With the advent of connected vehicles and penetration of IoT, RFID and FASTag logistics stands to become more versatile and flexible and therefore drive market growth with added vigor.
  - Operational efficiencies:
  - Demand forecasting
  - Real time tracking of cargo as well as health of driver
  - Truck platooning – combined fleets for multiple companies, increasing vehicle use-efficiency
  - Predictive maintenance of vehicles
  - Better tools results in better work environment, more satisfied drivers

[67]ARAI INDIA
[68]Times of India

Digitized trucking to increase efficiency:



Source: EY Analysis

4. Electrification of vehicles: Electric commercial vehicles

EVs are revolutionizing not only the passenger vehicles segment but also commercial vehicles segment and therefore, the logistics industry. However, the industry is closely watching for the government regulations and incentives, which will drive EV penetration in the Indian logistics sector.

- Some key benefits of EV are:
  - Saves fuel costs – 30% of total operating cost of truck.
  - Reduced driver cost – only one driver is needed, no need for conductor.
  - Lesser maintenance and repair costs – owing to the smaller number of moving parts.
  - Enhanced vehicle diagnostics.

5. Driver relay model: Technology startups have started entering the commercial driving segment giving rise to one of the biggest disrupters in the road transport sub-sector. Certain key features of this model are:

a. Extensive use of data analytics to optimize routes and ensure 100% resource utilization.

b. 24x7 monitoring and capturing each parameter of the truck, driver and shipment for process improvement.

c. Transparency for customers, with access to real-time tracking and status update.

d. Drivers drive multiple vehicles and exchange trucks in a relay.

e. Truck drivers return home the same day unlike the conventional industry practice where the driver is away from home for around 20-25 days.

f. The Indian logistics industry is still lagging, unable to make full use of this opportunity:

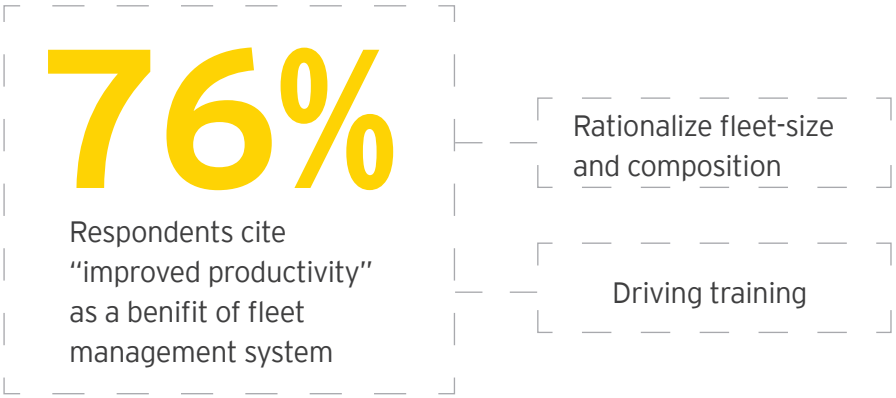
i. Indian logistics companies have introduced digital innovation at a much slower pace than competing economies such as China.

ii. 90% of the Indian logistics industry is in the unorganized sector where large investments, technical know-how, and future-vision are missing.

iii.Industry has a follower mindset when it comes to new investments.

iv. Culture of preventing small expenditures versus earning large rewards (profits) is holding back larger, more able organizations.

Figure 28: Driver relay model

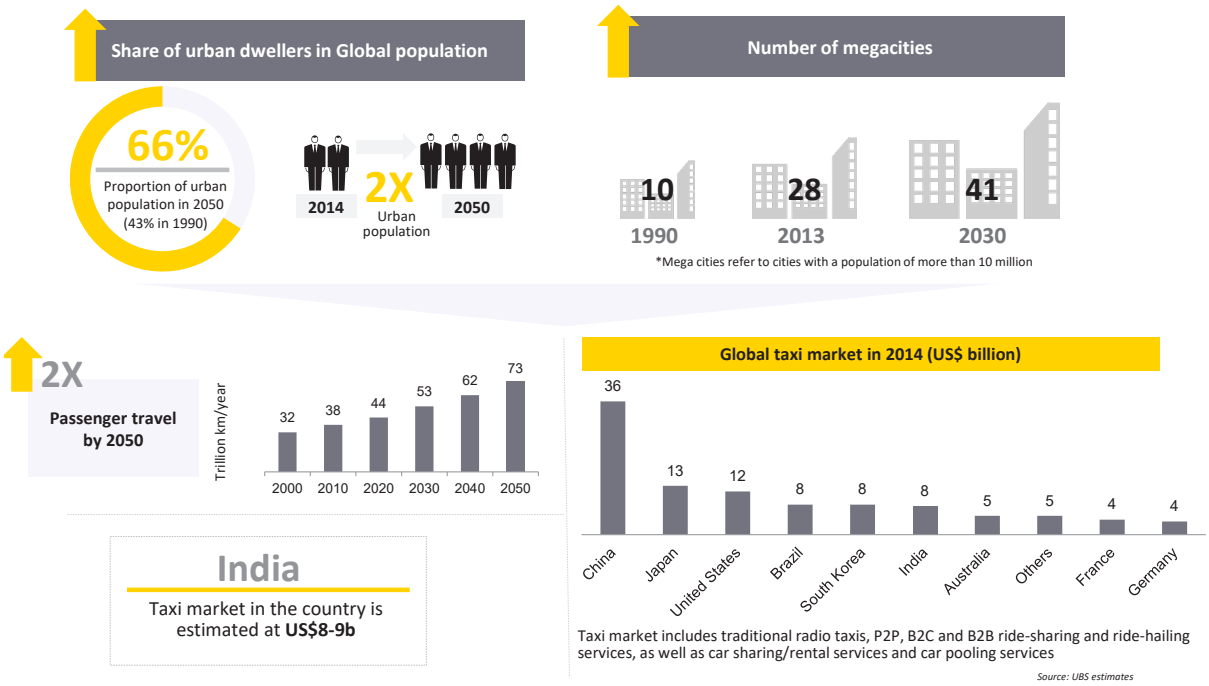


Source: EY Analysis

9.1.3. Driver demand from cab aggregators

Cab aggregators have changed the mobility scene in India, with major players like OLA and Uber capturing 97% of the market. Viewed as a superior and more comfortable alternative to the unpredictable auto-rickshaw and local taxi ride options, the on-demand taxi services provide advantages of reliable costing, availability, feedback and accountability.

Figure 29: Global and Indian taxi market continues to grow with rising urbanization levels and increasing megacity population



SOURCE: ACMA blue book

- The cab aggregators have grown almost four times since their entry in the Indian market. ~3.5 million rides were completed by OLA and Uber every day. With better roads in cities and people increasingly using the services of cab aggregators as a replacement of even owning their own cars, the demand of drivers will continue to grow.
- Some of the reasons for the exponential growth of cab aggregators segment are:
  - Increasing young and working population that require easy access to mobility.
  - Growing mobile penetration allows for a seamless process of booking and tracking of rides.
  - Rising congestion makes it more convenient to order rides versus driving own vehicle.
- Cab aggregators OLA and Uber have almost captured the entire tier 1 market. Although they have a significant presence in tier 2 and tier 3 cities, with growing infrastructure development resulting in better roads and increasing customer awareness, they are likely to repeat their dominant performance in sub-urban and rural areas as well.
- However, the supply of drivers to meet this demand will not necessarily be fulfilled in the coming years. The customer is becoming more demanding when it comes to the communication ability, politeness and behavioral correctness of the drivers and is diligent about recording feedback and experience through the feedback mechanism of the aggregator applications. This places additional pressure on the drivers as most drivers are coming from backgrounds where such behavioral correctness is not an expected norm.

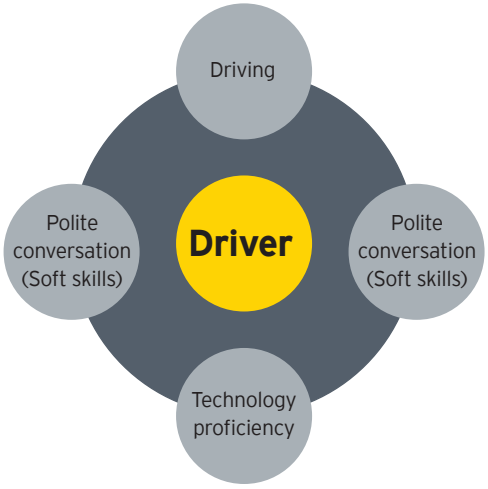
9.1.3.1. Major trends impacting the cab aggregator segment:

1. The government has come up with a major regulatory change in requirements for commercial driving licenses. In the recent advisory to state governments, MoRTH has done away with the requirement of commercial license for driving taxis, three wheelers, e-rickshaws and two-wheelers. This regulatory change has promoted workforce from diverse background to become drivers. The primary interaction indicated that workforce from the following background form the main source of drivers for cab aggregators segment: truck drivers, autorickshaw drivers, mechanics, car washers, etc. The cab aggregators have mostly exhausted these sources and will, in the future, be dependent on training new drivers through driver training schools and other training and recruitment initiatives.

2. Even cab drivers are being challenged by the market and technological trends.

- As more and more cab aggregators come into the field, competition will become fierce.
- In a race to provide the best service and get the best rating (which will contribute to popularity and demand among customers), drivers must now upgrade their driving, communication, customer service and vehicle maintenance skills.
- The modern customer also demands facilities such as Wi-Fi, music and entertainment as part of the ride.
- The modern cab driver must be able to provide these facilities and must maintain the vehicle at a level that meets customer expectations, i.e., the driver should be able to carry out predictive maintenance of the vehicle.

Figure 30: Additional skills and tasks of a modern cab driver



Source: EY Analysis

3. In view of the technological trends, an immediate requirement for every cab driver is the ability to handle a smart phone and use a GPS-based tracking application on it. Without this essential skill, it will become difficult for the cab driver to service pick-up and drop requests of customers seamlessly. As the technology in this field continues to evolve, the cab drivers will have to continuously upgrade their abilities and comply with the required training to remain viable for this job role.

9.1.3.2. Employment associated with fuel pump stations

Although there is a lot of activism around the EV adoption, the traditional ICE based mobility solutions are expected to stay dominant for at least the coming decade. The growth of ICE based vehicles will drive the business of fuel pump stations in the country.

Currently, there are around 62,500[69] refueling stations in India with the plan to open an additional 55,600 refueling stations across India in the coming years. Such an aggressive growth in the opening of fuel stations is expected to exponentially drive the employment in the segment.

9.1.3.3. Employment potential of EV charging infrastructures

To promote the commercial adoption of EVs in India, the GoI is promoting the development of EV charging infrastructure, as against the more popular means of subsidizing EVs.

1. EV charging infrastructure initiatives

- Ministry of Power (MoP) GOI, clarified that EV charging will be considered a service and not a resale of electricity. The charging of battery involves utilization of electrical energy which gets stored in the battery.
  - National Thermal Power Corporation (NTPC) is planning to set up 100,000 EV charging stations in India. On the similar lines, Bharat Heavy Electricals Ltd. plans to make batteries in India using the Lithium technology developed by ISRO.
  - Energy Efficiency Services Ltd (EESL) is in the process of sourcing 10,000 EV and about 4,000 EV chargers in India.
  - Rajasthan Electronics (I) Ltd, (REIL) is planning to set up 200 charging stations in Delhi, Jaipur and Chandigarh.
  - Among private players, Tata Power has a set up a pilot project of EV charging and is likely to install more in future.
  - Mahindra along with Ola has been setting up EV charging stations so far and will continue to be aggressive about this.
  - Fortum India, plans to enter and set up nationwide EV Charging stations.
  - Lithium Urban, an EV feet firm has plans to set up 60 charging stations.

Thus, the charging of battery of an EV involves a service by the charging station and earning revenue from the EV owner. The electricity is consumed within the premises owned by the charging station and hence is not a sale of electricity. This landmark notification has opened the charging infrastructure market and within a month of the notification various projects were launched within the country.

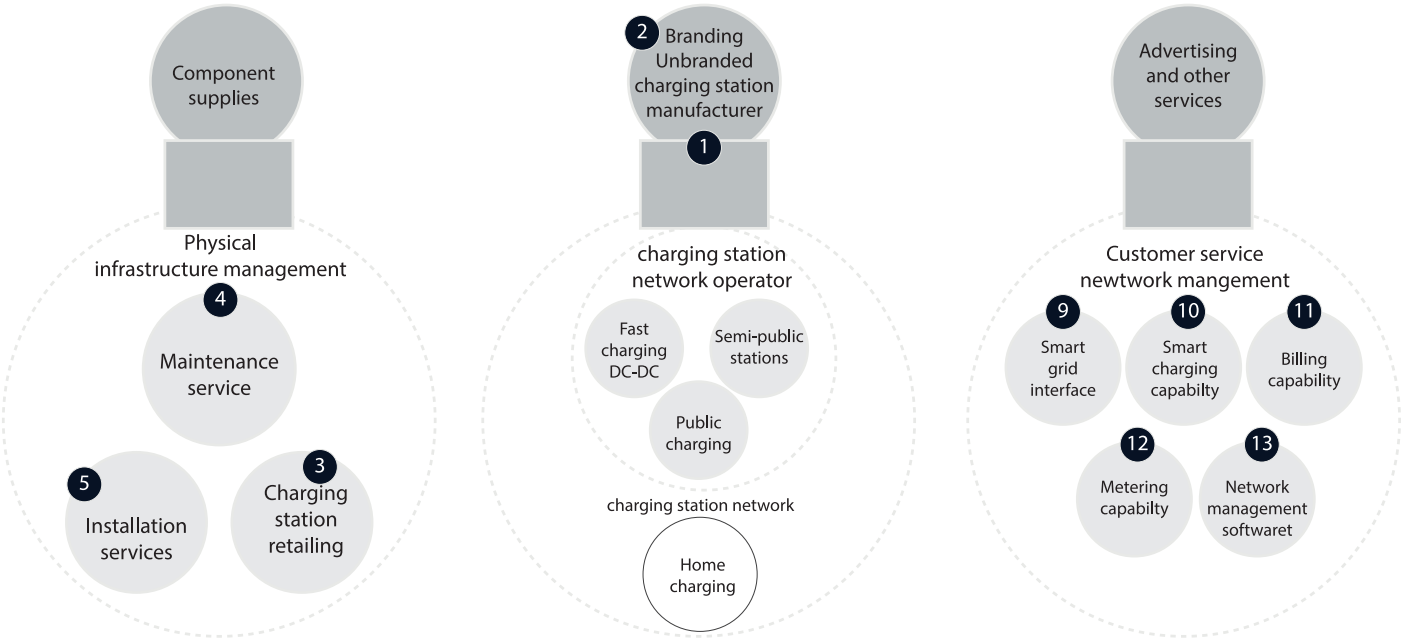
- This policy of promoting EV charging infrastructure has the potential to push the employment generation in the sector.
- Further, as the mainstream OEMs begin to roll out EVs, the role of charging infrastructure evolves from being an awareness tool to becoming a commercially viable business venture.

The development of EV charging infrastructure sphere will lead to employment generation in multiple avenues ranging from manufacturing the charging stations to setting up the physical infrastructure and managing the delivery of energy through the network of charging stations. The installation of changing stations will drive employment generation in the below segments:

[69] http://www.newindianexpress.com/business/2018/nov/26/fuel-pumps-set-to-double-in-number-1903402.html

- Charging station retailing would create the infrastructure hardware necessary for charging batteries
- Installation, maintenance and servicing of charging stations would install and then manage the operational reliability of charging stations
- Vehicle performance diagnostic for OEMs
- In-vehicle charging infrastructure information for EV drivers
- Mobile/Web-based customer portal
- Smart grid interface
- Billing capability
- Metering capability
- Charging station network management software
- Smart energy grid management
- Fleet management tools
- Engineering services

Figure 31: Additional skills and tasks of a modern cab driver



SOURCE: ACMA blue book

9.2. Demand analysis

1. Skill gap in the Indian road transport sub-sector:

- Given the dynamic changes in the industry owing to: (1) disruptive technologies, (2) new operational paradigms such as fleet sharing, (3) government regulations and directives on truck drivers and their work environment, the logistics workforce needs to upgrade its skill set to keep pace with these changes.
- While upskilling is the way forward, an understanding of the target group, which in this case is primarily truck drivers would be key in designing effective skilling programs to meet their unique requirement linked to poor socio-economic background, lack of education, etc.

2. Primary sources of road logistics drivers:

- Drivers and cleaners are employed simultaneously in a truck (made mandatory by law). With sufficient experience and demonstration of efficiency and skills, the cleaner goes on to become a driver and a driver goes on to become a supervisor.
- Youth in the age bracket of 16-18 years start as "chelas" (or apprentices) of the driver-cleaner duo, (very prominent culture in the sector). This is the existing mechanism of learning to drive a commercial vehicle. As chelas, they learn various skills such as effective communication and people skills to manage interactions at "nakas" (police check-points where vehicles are stopped and checked) and once they reach the age of 20-22 years, they become independent drivers.
- 10% of the drivers gradually move into entrepreneurship.
- Some companies are more selective. They hire only from Driver Training Institutes (DTI) and from referrals (word of mouth).

3. Incremental human resource requirement

- Global demand for commercial drivers:
  - There is a global demand for drivers across many countries, including Gulf Cooperation Council (GCC) countries, Canada and Australia. A number of Indians migrate to these countries. However, they have to go through the re-licensing and training in these countries where no institutional support exists. It is, therefore, an opportunity for Indian government to have institutional mechanisms to have a formal pathway program for people who are interested in migration which will result in a more structured movement of skilled manpower. A pilot initiative of ASDC with UAE is being discussed through NSDC and UAE institutions.
  - There is a huge demand for drivers in Gulf Cooperation Council (GCC) countries. Below is an analysis of 50 percentiles of drivers migrating from Indian states to GCC countries.

Table 16: Number of drivers migrated countries

Migrated from	Number of drivers (2017)
Uttar Pradesh	8568
Andhra Pradesh	4848
Rajasthan	2829
Bihar	2636
Tamil Nadu	2262
Punjab	2067
Kerala	1699
West Bengal	1189
Telangana	1084
Maharashtra	698
Karnataka	614
Assam	564
Jammu & Kashmir	554

Source: EY Analysis

Table 17: Number of drivers migrated to

Migrated to	Number of dwrivers (2017)
Saudi Arabia	16212
Kuwait	12752
Qatar	2118
Bahrain	387
Oman	101
Uae	9
Grand Total	31,579
Source: MEA 2017	30

Source: EY Analysis

9.2.1. Incremental human resource requirement

- **Global demand for commercial vehicle derivers which can be fulfilled by Indians**

Total drivers required in GCC till 2025: 2,70,000 commercial vehicle drivers.

Table 18 Yearly requirement of drivers globally.

Year	2019	2020	2021	2022	2023	2024	2025
Requirement ('000)	33	34	36	38	40	42	44

Source: EY Analysis

- **Drivers year-on-year employment (Employment in Million)**

Table 19: Year on year driver requirement

Year	2018	2019	2020	2021	2022	2023	2024	2025	2026
Commercial Vehicle Driver	6.80	7.56	8.20	8.74	9.16	9.73	10.51	11.40	12.32
3-Wheeler Driver	9.42	10.03	10.54	10.93	11.30	11.81	12.43	13.03	13.73
Cab Driver	1.0	1.09	1.19	1.30	1.41	1.54	1.69	1.84	2.01
Total Employment	17.22	18.68	19.93	20.96	21.88	23.08	24.63	26.26	28.06

Source: EY Analysis

- **Employment getting generated from fuel pump stations**
  Given the aggressive growth in expansion of number of fuel stations, it is expected that this will drive the employment within this sub segment, exponentially.

Table 20: Employment projection in conventional fuel pump

Year	2018	2019	2020	2021	2022	2023	2024	2025	2026
Fuel Pump	1.0	1.06	1.12	1.19	1.26	1.33	1.41	1.50	1.59

Source: EY Analysis

Employment in fuel pump stations

Basis the discussions under FAME II it is estimate that GoI plans to establish 1000-2025 charging stations on a pilot basis by 2021. Further, our estimate suggests that a maximum of three persons will work on a charging station. The employment scenario is as below:

Table 21 : EV charging station manpower requirement by 2021

Job Role	Employment numbers (actual)
Charging Attended/Station supervisor	1000-2025
Security Guard	1000-2025
Car washer/tyre inflator/Puncher repair	1000-2025
Total Requirement	3000-6075

Source: EY Analysis

Impact on jobs and skills:

1. Employment associated with fuel pump stations

Key job roles and skills required

- Fuel service man/ Fuel service dispensing attendant: This job entails a resource to work at fuel station and fill gas in the vehicles driven in the fuel station following safety procedures gas and protocols.
- Pollution control attendant: Individuals at this job need to assist customers in checking the vehicles and understanding the compliance pertaining to pollution control.
- QCP attendant: Individuals at this job need to assist customers in checking the vehicles and understanding the compliance pertaining to coolant, water and oil levels.
- Tire inflation attendant: Individuals at this job needs to maintain the air check facility existing at fuel stations. The individual needs to check the air pressure in vehicles coming into the fuel station using digital/ manual air facility.

2. Employment generation from development of EV charging infrastructure under FAME India Schem Phase II

Currently, two people are deployed on each fuel pump. The cycle time for a vehicle from entrance to the fuel pump station to station exit after refilling generally takes five to ten minutes. However, this will not be the case with EV recharging which typically ranges between 30 min to a few hours using a fast charger setup.

As per FAME II a typical charging station will have five chargers: three fast chargers and two slow/moderate chargers. Hence, having an attended per charger would not be economical. In this scenario it can be safely be assumed that a three-member team can manage each charging station in India to ensure smooth operation and its safety. Further, with this workforce the station would be able to provide value added services to the customer like car detailing, tire inflation, etc.

The three key job roles for EV charging station are:

1. Charging attended/Station supervisor:

Skills required/Key deliverables

- Technical knowledge of operating various types of charging station.
- Able to operate portable POS and credit card machines.

- Proficient in using mobile applications and should be able to guide customers in enrolment to the charging ecosystem to the proprietary application, ability to sell offers.
- Knowledge of various types of EVs and their battery specifications
- Basic maintenance of all chargers.
- Problem solving skills, should be able to debug problems with charger or difficulty in charging the vehicle.
- Constant upskilling on newer charging and EV technologies.

2. Car washer/tire inflator/puncture repair:

Skills required/Key deliverables

- Should be able to operate portable tire inflators due to unconventional setup of charging stations.
- Should be skilled in dry washing vehicles using minimal water.
- Should be able to repair tube and tubeless tires.
- Ability to inspect vehicle and suggest services being offered.
- Ability to maintain electric connectors of vehicle like preventive maintenance of charging points from collecting carbon build-up.

3. Security Guard:

Skills required/Key deliverables

- Fire fighter.
- Security of all EV chargers and its accessories.
- Ensuring safety of customer's vehicle.
- Ensuring safety of employees.
- Should keep a count of inventory.

3. EV infrastructure support job roles:

1. Field failure analysis engineer:

This engineer's primary role will be to diagnose new modes of failure in the field and to create debug and repair processes for customer support and repair technicians. The FA engineer will also at times be required to repair units in the field, assist in site surveys and installations of new charging products and support factory failure analysis and validation and reliability testing of DC chargers.

Skills required/Key deliverables

- Debug failures in the field and factory, as well as repair charge stations when necessary to get stations quickly back on line.
- Document field issues in detail to support root cause analysis, and to establish debug and repair processes.
- Create and update field debug and repair instructions and assist in the training of customer support and field install and repair technicians.
- Will work internally with HW and Quality engineers on validation, reliability and car compatibility testing
- Assist in site surveys, early installations of new products and installation verifications.

2. Customer support engineer:

This engineer will provide administrative, technical and network problem troubleshooting and resolution to station owners and field technicians by assessing needs and creating solutions to resolve issues. Support will be provided by clearly communicating technical solutions in a user-friendly, professional manner both via a ticket tracking system (email) and phone.

Skills required/ Key deliverables

- Commitment to customer driven support.
- Strong troubleshooting capabilities.
- Ability to accurately convey messages both verbally and in writing.
- Knowledge of relevant software computer applications and equipment.
- Maintains effectiveness when experiencing major changes in personal work tasks or work environment; adjusts effectively to work within new work structures, processes, requirements, or cultures.
- Comfortable with making next-step decisions and excited by "thinking outside of the box".
- Ability to effectively manage multiple processes to achieve a required goal.
- Focuses and guides self in accomplishing work objectives.
- Deals effectively with others in antagonistic situations, using appropriate interpersonal styles and methods to reduce tension or conflict.

- Technical/professional expertise is demonstrated through problem-solving, applying technical knowledge, and product and service management for the functional area in which employee operates.
- Actively appreciates and includes the diverse capabilities, insights, and ideas of others and working effectively and respectfully with individuals of diverse backgrounds, styles, abilities, and motivation.
- Sets high standards of performance for self; assuming responsibility and accountability for successfully completing assignments or tasks; self-imposing standards of excellence rather than having standards imposed.

4. Vehicle driver:

Every driver will be expected to have at least one extra complementary skill in addition to driving. These skills will create a new generation of drivers, provide structured career paths and make the career more aspirational. A permutation and combination of the skills mentioned below can be imparted to drivers' basis their driving requirements.

Hospitality	▶ People Skills: Ability to communicate with clarity and confidence to interact with customers ▶ Personal Attributes: Polite and friendly nature to make customers feel welcome
Loading/ Unloading	▶ Loading and unloading baggage that customers might be carrying with care.
Handling Hazardous Material	▶ Precision: Handling chemicals and other equipment with care. ▶ Knowledge: Having the required informational capital to handle any faults, ie. Machine faults, chemical leakages etc.
Basic mechanics	▶ Knowledge: Having the required information to troubleshoot in an event that the vehicle faults.
Basic mechanics	▶ Knowledge: Having the required information to troubleshoot in an event that the vehicle faults.
Tablet Computer Training	▶ GPS Reading: Knowledge regarding use of GPS and satellite applications ▶ Route Optimization: Using technology and insight to minimize time and maximize efficiency during a commute
Financial Management	▶ Financial Literacy: Ability to make money-related decisions ▶ Ability to manage personal finances ▶ Ability to use technology based financial applications
Vehicle Detailing	▶ Cleaning: Cleaning interiors and exterior to maintain hygiene and presentability.
Self-Motivation Training	▶ Education – Educating the drivers on life-skills will lead to personal empowerment ▶ Realization of Purpose
Transportation Management training	▶ Responsibilities for transportation of cargo & day-to-day operations ▶ Ability to resolve all the challenges that arise in the transport department. ▶ Overseeing the timely maintenance checks of all the vehicles ▶ In-charge of setting the routes for the vehicles, dispatch of the buses, working out their schedule, and managing the driver.

Source: EY Analysis

Current training infrastructure

In this chapter, we expand on our understanding of the Indian automotive sector's workforce supply. More than 90% of the manpower in the automotive industry constitutes of blue collar labor. The principal source of supply of blue collar is largely catered by ITI, polytechnics and informal markets. While engineering colleges and other institutes (commerce, arts, etc.) cater to the white collar and middle management roles. A fraction of the demand is met by the private/government skill institutes.

10

10.1. Industrial training institute (ITI)

These institutions have been the essential providers of skilled manpower for the sector. The programs undertaken at ITIs are essentially categorized as long-term trainings, typically spanning more than six months. Following is the current outlook at ITIs, mapped trade wise and sub-sector wise for the automobile sector:

Total ITIs in India	13,105
Government ITIs:	2,293
Private ITIs	10,812
Total trades in ITIs	150+
Number of trades which can be categorized under the automotive sector:	40
Total seat count in ITIs for all trades:	3.4 million
Total seat count for manufacturing trades	1.4 million
1. Seat count for core automotive manufacturing trades	**0.20 million**
2. Seat count for other manufacturing trades (relevant to the auto industry)	**1.18 million**

Source: EY Analysis

Table 22: 2016 analysis of ITIs:

SN	Trade Name	ITI Count	Seat Count	Trainee Count	% of Seat Utilization (2016)	Trade linkage with Sub Sector
1	Fitter	9,709	7,77,189	5,34,409	68.80%	OEM, Auto Component
2	Welder	2,558	1,25,139	74,494	59.50%	OEM, Auto Component, Dealership Service
3	Electronics Mechanic	1,842	1,16,558	66,901	57.40%	Dealership Service
4	Mechanic Diesel	1,994	99,204	65,199	65.70%	Dealership Service
5	Mechanic (Motor Vehicle)	1,417	76,167	54,011	70.90%	Dealership Service
6	Turner	779	42,704	29,016	67.90%	OEM, Auto Component
7	Draughtsman (Mechanical)	582	32,708	13,329	40.80%	OEM, Auto Component
8	Machinist	517	30,064	21,559	71.70%	Auto Component
9	Instrument Mechanic	204	12,818	7,617	59.40%	OEM, Auto Component
10	Mechanic (Tractor)	226	8,778	6,471	73.70%	Dealership Service
11	Sheet Metal Worker	247	8,652	4,540	52.50%	OEM, Auto Component
12	Foundryman	147	5,922	2,138	36.10%	OEM, Auto Component
13	Driver Cum Mechanic	194	5,502	639	11.60%	Driver Demand
14	Machinist (Grinder)	101	4,976	3,110	62.50%	Auto Component
15	Plastic Processing Operator	92	3,801	2,123	55.90%	Auto Component
16	Tool & Die Maker (Press Tools, Jigs & Fixtures)	60	3,612	2,320	64.20%	OEM, Auto Component
17	Mechanic Computer Hardware	73	3,276	52	1.60%	OEM, Auto Component, Dealership Service
18	Pump Operator Cum Mechanic	99	2,919	1,936	66.30%	In-direct employment
19	Mechanic Machine Tool Maintenance	48	2,814	1,992	70.80%	OEM, Auto Component, Dealership Service
20	Mechanic Auto Electrical and Electronics	63	2,163	1,564	72.30%	Dealership Service
21	Front Office Assistant	39	1,950	669	34.30%	Dealership Sales
22	Tool & Die Maker (Dies & Moulds)	39	1,806	1,152	63.80%	OEM, Auto Component
23	Mechanic Motor Cycle	32	1,218	620	50.90%	Dealership Service
24	Welder (GMAW & GTAW)	28	1,176	864	73.50%	OEM, Auto Component, Dealership Service

Source: EY Analysis

[70] https://community.data.gov.in/industrial-training-institutes-itis-as-on-april-2016/
[71] http://ncvtmis.gov.in/Pages/ITI/TradeStats.aspx
[72] Majority of these trades are shared with manufacturing.

10.2. Short term training:

These centers have been setup under the Skill India initiative of the government. These centers have contributed towards enhancing reach of training for basic level roles. This section will only discuss the capacity created by the NSDC scheme Pradhan Mantri Kaushal Kendra (PMKK).

Total PMKKs (2019)	611
Total PMKKs with automotive job roles	85
Total training capacity for all job roles in 611 PMKK	13,05,600
Total training capacity for 11 automotive job roles in 85 PMKK	40,800 – 54,000
Number of trades which can be categorized under the automotive sector:	40

Source: EY Analysis

- Per year capacity in PMKK[73]

SN	Job Roles	Max Capacity per Year	Job Role linked with Sub Sector
1	Automotive Service Technician (2&3 We)	28,000	Dealership Service
2	Chauffeur / Taxi Driver	5,300	Driver Demand
3	Machining And Quality Technician	4,300	Dealership Service
4	Showroom Hostess - Customer Relationship Executive	4,300	Dealership Sales
5	Dealership Sales & Value-Added Services Executive	3,400	Dealership Sales
6	Dealership Telecaller Sales Executive	3,400	Dealership Sales & Service
7	Welding and Quality Technician	3,400	OEM, Auto Component, Dealership Sales
8	Chauffeur	1,400	Driver Demand
9	Automotive Service Technician	1,000	Dealership Service
	Grand Total	54,500	

Source: EY Analysis

▶ PMKVY CSCM and CSSM training performance (2016-19) in automotive job roles

Sub-sector	Trained			Assessed			Certified			Placed		
	CSCM	CSSM	Total	CSCM	CSSM	Total	CSCM	CSSM	Total	CSCM	CSSM	Total
Automotive Service Technician (2&3 WE)	12,036	246	12,282	11,106	217	11,323	9,679	196	9,875	6,190	28	6,218
Chauffeur / Taxi Driver	6,309	477	6,786	5,414	224	5,638	5,030	212	5,242	2,701	58	2,759
Showroom Hostess - Customer Relationship Executive	3,253	632	3,885	3,043	432	3,475	2,783	400	3,183	1,796	20	1,816
Welding and Quality Technician	3,252	80	3,332	2,917	69	2,986	2,774	62	2,836	1,721	-	1,721
Machining and Quality Technician	3,098	30	3,128	2,740	14	2,754	2,474	14	2,488	1,362	-	1,362
Dealership Telecaller Sales Executive	2,487	609	3,096	2,167	328	2,495	1,941	286	2,227	832	48	880
Dealership Sales and Value Aadded Services Executive	1,121	60	1,181	1,086	59	1,145	1,007	56	1,063	663	-	663
Taxi Driver	60	699	759	60	358	418	53	327	380	-	77	77
Sales Consultant (Automotive finance)	60	475	535	58	441	499	-	341	341	-	155	155
Car Washer and Assistant Service Technician	417	52	469	351	47	398	347	46	393	94	-	94
Telecaller	-	465	465	-	308	308	-	270	270	-	43	43
Automotive Service Technician	-	462	462	-	271	271	-	256	256	-	1	1
Showroom Hostess / Host	240	205	445	149	118	267	-	111	111	-	6	6
Commercial Vehicle Driver	269	86	355	189	28	217	185	23	208	128	-	128
Auto / E Rickshaw Driver & Service Technician	270	30	300	240	16	256	240	10	250	-	-	-
Sales Consultant	-	240	240	-	165	165	-	138	138	-	99	99
LIGHT MOTOR VEHICLE DRIVER	-	239	239	-	190	190	-	186	186	-	-	-
CNC Operator / Machining Technician	-	60	60	-	40	40	-	35	35	-	-	-
Total	32,872	5,147	38,019	29,520	3,325	32,845	26,513	2,969	29,482	15,487	535	16,022

Source: EY Analysis

[73] Training capacity has been calculated as per Jun 2019 targets allocated, scheme policies and impanelled training partners. These values may change as per the changes in the mentioned.

10.3. Cluster wise demand supply analysis

As highlighted earlier in the report, there exist manufacturing clusters within the automobile sector. These clusters house a concentration of OEMs and auto component manufacturers. It is imperative to identify the capacities for creating skilled manpower, within these clusters. This will lead to a creation of cluster / region / state strategy of building capacity to support the manufacturing clusters. The supply for dealership sales and service are spread across the country. Also, the driver supply is fulfilled from all over the country:

SN	Sub-sector	State/Cluster	Skill India yoy max. capacity	ITI yoy capacity	Total Capacity
1	Manufacturing (OEM, Auto Comp)	Jamshedpur-Kolkata-Silchar (East)	5,800	74,086	79,886
2	Manufacturing (OEM, Auto Component)	Mumbai-Pune-Nasik-Aurangabad (West)	3,800	1,14,990	1,18,790
3	Manufacturing (OEM, Auto Component)	Chennai-Bangalore-Hosur (South)	1,400	1,24,317	1,25,717
4	Manufacturing (OEM, Auto Component)	Delhi-Gurgaon-Faridabad-Rae Bareilly(North)	7,200	3,17,341	3,24,541
5	Dealership Sales	Pan India	11,100	2,340	13,440
6	Dealership Service	Pan India	33,300	1,99,584	2,32,884
7	Road Transport	Pan India	6,700	5,502	12,202

Source: EY Analysis

Recommendations

11

11.1 Recommendations for policy reforms

Support the competitiveness-enhancing initiatives of corporates to spur growth in the sector and employment: It is imperative that players in the automotive value chain be supported in their effort to stay competitive and survive the recent slowdown. The focus should be to support the sectors in staying competitive. This is also critical because not only does the sector creates direct employment, but it also supports a significantly high number of indirect employment opportunities in the other organized and unorganized sectors. Thus, decline in competitiveness of the sector could create serious ripple effects across the economy, reducing direct and indirect jobs in their operating ecosystem.

Support in the workforce capacity building of sub-sectors – vehicle services and commercial vehicle drivers by linking it to the Skill India Mission: The government must support the vehicle services and commercial vehicle drivers segment whose competitiveness is largely dependent on cheap labor. It is well recognized that the OEMs and auto component manufacturers have access to semi-skilled to skilled labor force and also have inhouse established practice of training workforce, however, the other continuum of the automotive supply chain that includes vehicle services and commercial vehicle drivers are pretty unorganized and don't have any established linkage to the open market for hiring skilled/semi-skilled manpower. Further, these segments lack the existence of any systematic manpower training process inhouse. Therefore, the role of the policy makers is to support these segments in their workforce capacity building by linking their workforce requirements to the initiatives under Skill India Mission.

Promote apprenticeship among largely unorganized tier 2 and below auto competent manufacturers and unorganized vehicle service segment: Recognizing the significance of apprenticeship in reinforcing the its skilling initiatives and improving the participation of industry, the GoI launched the ambitious National Apprenticeship Promotion Scheme (NAPS) scheme to promote apprenticeship in August 2016. However, the largely unorganized segments of the automotive value-chain remains oblivious to this initiative and continue to hire unskilled laborers. Therefore, it is suggestive to enhance the reach of NAPS and other apprenticeship promotion schemes and target the unorganized segments in motivating them to hire apprentices. Taking the apprenticeship schemes to the unorganized segment will not only help in formalizing the hiring and training of their workforce but will also support their productivity enhancement.

Promote the "Recognition of Prior Learning" (RPL) route to create alternative career pathways: It is a well recognized fact that Indian automotive sector players hold qualifications to an equal footing to skills of an individual. This system of industry preferring qualification and skills of an individual as both significant has led to organized segments like OEMs, auto component manufacturers, dealership sales only hiring individuals coming out of the formal educational and long-term vocational training system. This practice has also led to the system being closed for workforce in informal employment, those who have skills but due to their social and economic conditions lack formal qualifications. It is necessary for the government to create alternative pathways through RPL to recognize the on-the-job experience of workforce as qualifications. RPL is currently being done under PMKVY 2.0, however there is little industry recognition of the RPL. To create the alternative career pathways for workforce with experience but lacking qualifications it is necessary for the government to work towards achieving the recognition of RPLs for hiring. This will help the workforce with relevant experience in informal employment to move up in value chain. This will also help towards making informal employment aspirational.

Make the job of commercial driver aspirational by investing in their capacity building and improving their working conditions: It has emerged that there is acute shortage of drivers for commercial vehicles in India with the vehicle to driver ratio at 0.8. One of the primary reasons for this shortage of commercial drivers being the extremely harsh working conditions in commercial driving and the job of commercial drivers lacking aspirational value. Poor working conditions, away from home for long duration, ranging from 1-15 days in every month, long work hours, chronic illness, lack of sleep and sleep disorders. These conditions together with lack of infrastructure along Indian highways have acted as deterrent for people to become commercial drivers. It is necessary for the Government to take steps towards making the job of commercial drivers aspirational. A way forward in this direction being making the job of commercial drivers entrepreneurial by financially supporting them in becoming owners of the vehicle they drive.

Support the different sub-sector in their capacity building initiatives by utilizing their in-house training capacity for up-skilling and re-skilling: Skill gap between the students coming out of the educational and skilling system and the requirements at the workplace is high, forcing companies to set up large training centers. These training centers established by the sector players are state-of-the art training centers with modern training equipments. Sector players have voiced their demand for allowing the excess capacity available at these training centers to be used for training of youth to meet sector demand. Such demand of the sector players may be allowed and these centers can be linked with GoI's Skill India program.

Support skilling of industry workforce on Industry 4.0 skilling: Industry 4.0 technologies such as Industrial IoTs, 3D printing, robotics, etc. have started to make their impact on the automotive sector. Industry executives have voiced their concern on the gap between industry demand and curriculum offered by educational institutes. There is an urgent need to focus on institutional upgradation and teaching new technologies. There need to be complete review of the curriculum, teacher training and training infrastructure requirements considering these new technologies. Further, a long-term perspective is needed to successfully meet the objectives of Skill India. To enable the skilling on Industry 4.0 it is necessary for the policy makers to enhance the standards of training ecosystem, which would undergo a change given the new technology and tools being incorporated, across functions. These would include elements like:

- Lab design
- Pedagogy
- Hybrid learning methodology
- Framework for involving industry during the training process

Collaborate with and incentivize industry for skilling on Industry 4.0: The role of the industry in skilling is critical. Participation of automotive OEMs, auto component manufacturers and dealership operators will help in ensuring the mobilization of the much needed funds, infrastructure and technology knowhow for countrywide skilling for the future job roles. To enable these players, it would be useful to create joint engagement platforms and provide them with incentives. ASDC is a platform whose role and responsibilities needs to be redefined to make them the agents to drive skilling in Industry 4.0 technologies.

Create fund to promote joint new technology or business model proposals from industry and academia: There is a requirement for the triple helix model of academia, industry and government working together to drive innovation and research to create the new generation jobs. However, getting this partnership going has been challenging. The government can take the lead to drive this behavioral change among the stakeholders.

Formulate life-long learning strategies and drive behavioral change among citizens toward life-long learning: The dominant mindset of most Indians is that formal learning is till the age of 20 to 25 years and the focus of rest of the life is on experiential learning, typically at workplace. This has been bolstered by the structure of the current education system. In the era of disruptive technologies, no learning is current for long as new knowledge and technologies are being created, amended and replaced at fast pace. It becomes critical at the individual level that people embrace life-long learning to stay relevant, while the government creates the enabling ecosystem for it. Many of the progressive governments across the world are realizing the importance of reskilling and life-long learning for their workforce. The Singapore Government has introduced the SkillsFuture program to support life-long learning among its citizens. This is supported by subsidies, scholarships and sponsorships.

11.2 Recommendations for industry

- **Create collaborative learning ecosystems for the automotive sector**: Industry in India have faced a regular criticism on their lack of participation in the social cause of skilling and reskilling. Individual companies within the automotive value chain can work toward towards creating a collaborative learning ecosystem in their respective sectors to skill workforce/ students. These models will be more effective as these will be pioneered by the industry members who are in the best position to ascertain the demands of the sector. Sector players collaborate to pool resources and effectively meet the training demand of the sector. Standardized curriculum could be developed with the support from educational institutes and can be made available through MOOCs , universities and traditional training mechanism.
- **ASDC, in collaboration with industry and institutional partners, must forge an integrated framework to meet the imminent future skill demand encompassing**:
  - Identification of enhanced and market-relevant job role with key focus on following areas:
    - Advanced robotics and automation
    - Artificial intelligence and machine learning
    - Cloud computing and remote solutions
    - Industrial Internet of Things
    - 3D printing and digital fabrication mediums, etc.
    - Electric vehicle technologies
    - Data analytics for sales and customer service functions
    - Digital marketing
  - Creation of additional relevant NOSs to support the new job roles that are emerging as a result of enhanced market-relevant jobs
  - Upgradation of existing NOSs for current job roles that will undergo a change due to the evolving context
  - Design of curriculum and content development to address the needs of adopting newer technologies and processes for existing and new job role training, wherein certain imperatives are:
    - Rapid content updation capabilities
    - Enhanced learner experience through interactive content
    - Co-creating content with industry
    - Benchmarking curriculum and content to international standards, to leverage international employment potential
- **Develop workforce re-training programs across organizational levels:** For the existing workforce, there needs to be large-scale re-skilling on exponential technologies and their potential applications. Companies are working on improving the digital quotient of their employees. We are beginning to see this in sectors beyond service sectors, such as traditional manufacturing sectors. The expectation is that even shop floor workers with their experience would able to suggest innovative process improvement solutions if they are aware of the technology possibilities. At the supervisory and mid management levels, the training focus is on awareness and process improvement programs using these technologies. Finally, at the senior management levels, the focus is on strategic implications, new products and business models.
- **ASDC to support the unorganized segment - tier 3 and tier 4 auto component manufacturers dealership service in aggregating their workforce demand for apprenticeship:** ASDC can support the industry towards meeting its demand for skilled manpower. A way forward in this direction is apprenticeship, however, the aforesaid unorganized segments of the automotive value chain have limited intake from skilling initiatives and prefer hiring freshers. ASDC can convince sector players to offer apprenticeship and hire candidates from Government's skilling initiatives such as PMKVY, DDU-GKY , etc. Further, ASDC can motivate and aggregate the demand from the sector players and offer apprenticeship.
- **ASDC to support and actively engage the labor-intensive sub-sectors such as dealership sales and service:** Dealership sales and service are substantial employment contributors; however, their unorganized nature keeps them at bay with the skilling initiatives. ASDC needs to engage them in making them equal partners in creating skill manpower, by way of:
  - Partner in revising NOSs to reflect new trends of service at home, enhanced processes at the service center.

- Co-create NOSs for roles within the informal sector – especially roadside mechanics and sales function at sub-dealers.
- Revamping internal training programs to reflect the new requirements of these roles through use of digital interface being adopted while interacting with customers.
- Partnering as a training provider, by leveraging their existing servicing workshops. These would be very useful in providing an impactful hands-on training to candidates and also upgrading skills of roadside mechanics

- **Industry needs to contribute towards the goal of creating future ready skilled manpower:** Since this is a critical success factor for their sustained growth. Some of the areas that need to be worked upon are:
  - Co-creating enhanced and new NOSs, curriculum and content, in collaboration with the ASDC and other respective agencies.
  - Take a lead in setting up Centers of Excellence, to demonstrate and make available the facilities and technology of modern manufacturing. With the industry setting a benchmark through COEs, a quality scale up is more feasible.
  - Partner in revamping ITIs and other skill development institutions, through:
    - Partnering with respective government department and agencies towards a more conducive skill policy and deployment planning.
    - Enhanced adoption of ITIs, with contribution by way of training through line functionaries, content enhancement and exposure to R&D facilities.
    - Partner in refurbishing ITI laboratories in line with modern shop-floor requirements
    - Conduct faculty immersion programs to provide faculty with shop-floor experience.
    - Deploy robust apprentice programs, with focus on learning outcomes during apprenticeship.
    - Industry to extend similar support to polytechnics and engineering colleges to develop resource pool at different levels along the value-chain.

- **Work in close partnership with the government to ensure success of its efforts to take advantage of Skill India Mission:** The need for a partnership between sector and Government has never been more important than today, when disruptive forces are expected to have large-scale impact. Through the Skill India Mission Government is providing the much-needed impetus to vocational education in India. Industry associations and leading companies need to support the Government by providing inputs on how the Indian society, workforce and education systems should be and look like going forward, enthusiastically participate in all engagement platforms and support the implementation efforts (typical weak link in large-scale government initiatives) through resources, knowhow and well-designed PPP models.
- **Evaluate building Centers of Excellence on emerging technologies:** Given the changing pace of technology and the changing expectations of the consumers, it is necessary for the automotive sector players to find ways to build products that can function in these changing realties. Establishing Center of Excellence can be a way forward in this direction. These centers can provide different players to collaborate and support the progress of the sector in these difficult times. Emerging domains such as automotive analytics, digital factory can be the domain for such centers.
- **Industry-academia collaboration for better demand-supply matching:** Today a majority of the workforce recruited by the OEMs and auto component manufacturers is coming from either polytechnics or ITIs. However, it is generally the case that industry players have institutionalized their in-house employee training system for the new hires recognizing the gap in their expectations and the training being imparted by these supply institutes. This is a resource and time slack and it is necessary that industry work towards the capacity building of polytechnics and ITIs to make them a finishing school and supply the workforce as per the industry demand.
- **Industry led upgradation of qualification packs:** Qualification packs need to be revised, catering to changes in the industry requirements for the current job roles. Alignment to special skills like digital marketing, infotainment system and diagnostic equipment, is also required urgently.
- **Engage unorganized road side garages to skilling initiatives:** There are a large number of mechanics working in local garages and tier-3 technicians in the

manufacturing sub-sector with no formal training. There is a need to mobilize such technicians, assess the skill acquired by them, compare it with the skill required and conduct short bridge courses to close the gap and then certify them to enhance employability in line with dynamic industry demands. ASDC has already started a pilot project under the banner India Skill Revolution and more such targeted initiatives need to be undertaken.

- **Implement job rotation:** Job rotation is the systematic movement of employees from job to job within the organization. Rotating employees within the organization into different roles helps broaden their skill sets, especially for entry-level employees. Job rotation also helps organization in driving flexibility in operating with employees who are well rounded and can fill different roles. Job rotation is especially helpful in preparing employees for leadership roles because as they move into senior leadership positions, by breaking out of the functional silos. The need for job rotation is more important today as organizations are getting disrupted from forces not only within the industry but occasionally outside. Job rotation will help in continuous learning and refreshing of knowledge of business operations at a more strategic level.
- **Support the largest employment proving segment of commercial drivers:** The transportation and logistics sub-sector is growing exponentially owing to the e-commerce, technology disruptions and so on. 90% of the Indian logistics industry is in the unorganized sector where large investments, technical know-how and future-vision are missing. There is an acute shortage of skilled drivers to meet the present demand and given the projected growth of the industry, this demand will continue to grow. Currently, there are 0.6 drivers per vehicle which should ideally be at least 2.5 per vehicle. The existing drivers are now being challenged by enhanced service expectations, regulatory norms such as BS-VI, emerging technologies owing to fleet companies evolving due to real-time load sharing, use of mobile applications for route optimization and job distribution and so on. In line with these changes in the sub-sector, following actionable need to be undertaken:
  - Upskilling of existing drivers on soft skills, safety and regulatory norms
  - Focused initiative on setting up driver training institutes, in collaboration with industry
  - Working on aligning existing NOS of commercial drivers to international benchmarks. This would enable fitment of domestic resources for overseas employment opportunities

11.3 Recommendations for academia:

- Collaborate with industries: To prepare the labor maker in the country for future challenges, it is necessary for the academic setup to be rejuvenated. The major issues plaguing the educational system in the country include poor infrastructure, outdated curriculum, lack of qualified and trained teaching staff and absence of connect with industry. Addressing the entire gamut of these issues is out of the scope of the present study; however, developing a healthy partnership between academia and industry will help in addressing many of these fundamental constraints.
  - Enabling and integrating higher technical education institutions by means of finishing school initiatives to provide demand driven skill certifications to complement education with industry-aligned programs to enhance employability potential of the youth in line with the demands of the industry and develop a seamless mechanism to enable youth with the opportunity to become job-ready on completion of education.
- Focus on cognitive/judgment-driven skills: The rapid pace of change in jobs and skills is creating a growing demand for updated skills. There is an opportunity for educational institutes to transform their offerings from employability-enhancement skills to those related to the thinking, complex problem solving, and decision making among others. Educational institutions must keep pace with rapidly evolving technology, to enable individuals to be future ready and reduce their rate of obsolescence.

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