Feynn Labs Internship Team project:1

Market Segmentation Analysis on EV Market in India

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Github link: https://github.com/Priyanka-Badiger/EV-market-segmentation

Problem Statement:

Task is to analyze the EV Market in India using Segmentation analysis and come up with a feasible strategy to enter the market, targeting the segments most likely to use their product in terms of Geographic, Demographic, Psychographic, Behavioral.

Introduction:

The market for electric vehicles (EVs) is expanding quickly on a global scale. According to EV volumes, the total number of electric vehicles (including battery electric vehicles [BEVs] and Plug-in hybrid electric vehicles [PHEVs]) on the road increased from 4.2% in 2020 to 8.3% in 2021, with 6.75 million vehicles. As of 2020, this represents an increase of 108%. As they contribute to lowering emissions and the depletion of natural resources, EVs are gaining popularity around the world. Since close to 0.32 million vehicles were sold in 2021, an increase of 168% YoY, the Indian EV sector is likewise developing quickly. The Paris Agreement, which aims to reduce carbon emissions, improve the quality of the air in urban areas, and decrease oil imports, is the foundation for India's ongoing adoption of electric vehicles.

EV market:

By 2030, the Indian automobile sector, which currently ranks fifth globally, is projected to overtake the United States as the largest. According to the India Energy Storage Alliance (IESA), the Indian EV market would grow at a CAGR of 36%. Because India imports about 80% of its crude oil needs, dependency on conventional energy sources is not a viable choice as population growth and vehicle demand increase. By 2030, NITI Aayog wants to see EV sales penetration for all commercial vehicles reach 70%, for private vehicles reach 30%, for buses reach 40%, and for two- and three-wheelers reach 80%. The objective of achieving net zero carbon emissions by 2070 is consistent with this. According to the Ministry of Heavy Industries, 0.52 million EVs have been registered in India over the last three years. EVs experienced strong growth in 2021, which was aided by the government's adoption of beneficial laws and initiatives.

Problem statement breakdown:

EV market segmentation is done based on geographic, demographic, psycho graphic, behavioral factors.

Fermi estimation:

	FERMI
Population of India	1 500 000 000 000
Population having EV	1 500 000
Population of non-potential buyers	1 000 000
Population of metros	1 000 000 000

According to Fermi Estimation out of 666 people 1 is likely to buy an EV

Actual rough calculations predict that 1 out of 762 people are likely to buy an EV

Sl.no	**States**	**No. of charging stations**
1	Andra Pradesh	4
2	Arunachal Pradesh	2
3	Assam	7
4	Bihar	3
5	Chandigarh	6
6	Chhattisgarh	4
7	Dadra and Nagar Haveli	8
8	Delhi	322
9	Gujrat	27
10	Haryana	55
11	Himachal Pradesh	7

12	Jharkhand	7
13	Karnataka	58
14	Kerala	57
15	Madhya Pradesh	27
16	Maharashtra	88
17	Manipur	1
18	Meghalaya	1
19	Nagaland	2
20	Odisha	2
21	Puducherry	1
22	Punjab	11
23	Rajasthan	27
24	Sikkim	4
25	Tamil Nadu	94
26	Telangana	65
27	Tripura	2
28	Uttar Pradesh	108
29	Uttarakhand	6
30	West Bengal	22

People are more likely to buy EVs in states having a decent number of charging stations and seeing the above data WEST BENGAL, HARYANA and KARNATAKA might have a potential for an EV startup.

Market Overview

The Indian electric vehicle market was valued at USD 1,434.04 million in 2021, and it is expected to reach USD 15,397.19 million by 2027, registering a CAGR of 47.09% during the forecast period (2022-2027).

The COVID-19 pandemic had limited domestically produced electric vehicles due to the shutdown of manufacturing facilities and lockdowns. However, as restrictions eased, EV witnessed optimistic growth as consumers became inclined toward affordable eco-friendly transportation supported by government incentives.

The automotive sector in India is dominated by two-wheelers (scooters, motorbikes) and three-wheelers (autos and rickshaws) that play a significant role in last-mile mobility in the country. Rising government emphasis and focus on private and government players partnership to enhance EV ecosystem in the country. Increasing investments and product launches by major OEMs into the country and their focus on localising supply chain facilities are expected to create a positive outlook in the market.

Moreover, in India, the level of market maturity also varies according to the state depending on factors, including demographics, income levels, regulatory landscape, and urbanisation. For instance, the state of Uttar Pradesh, with one of the lowest urbanisation rates, has seen significant uptake of electric two-wheelers. Maharashtra, on the other hand, with a higher urbanisation rate, has the highest penetration of electric three-wheelers and passenger cars. Delhi is home to the largest electric commercial vehicle fleet due to a higher demand for electric buses and trucks.

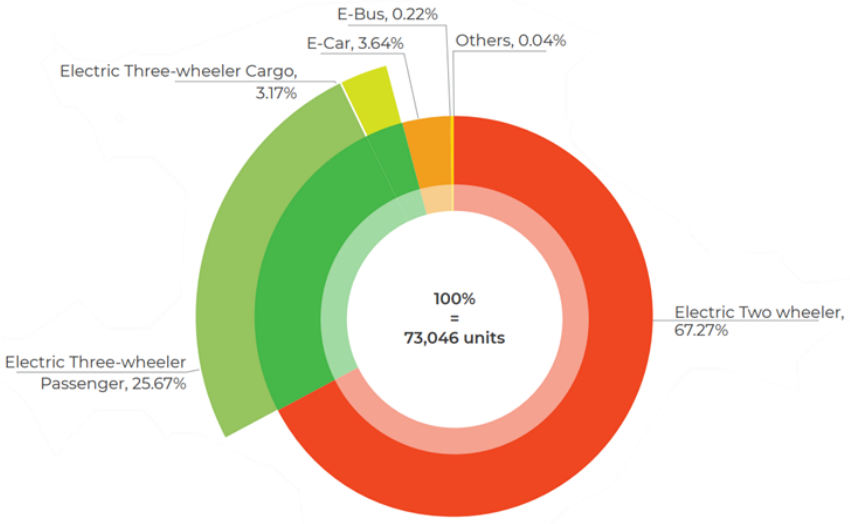
Segmentation by Key Market Trends

Adoption of electric buses to reduce emissions pertaining to international conventions and develop e-mobility in the wake of rapid urbanisation.

- The National Electric Mobility Mission Plan (NEMMP) and Faster Adoption and Manufacturing of Hybrid & Electric Vehicles in India (FAME I and II) helped create the initial interest and exposure for electric mobility.
- To promote the domestic electric vehicle industry, the Indian government has provided tax exemptions and subsidies to EV manufacturers and consumers. As per the phased manufacturing proposal, the government has imposed a 15% customs duty on parts that are used to manufacture electric vehicles and 10% on imported lithium-ion cells. The revised duty under PMP has been proposed from April 2021.

- States have also launched policies that support powertrain electrification by stimulating the demand, local manufacturing, research and development (R&D), and infrastructure development.
- According to the Delhi Electric Vehicle Policy 2020, the government plans to have at least ++++50% e-buses for all new stage carriage buses and aims for 25% of the new vehicles to be electric by 2024. In March 2021, the Delhi government announced its plans to introduce an interest subvention of up to 5% for electric vehicle (EV) purchases in the state. This initiative has been taken to promote the Delhi government's EV policy offering financial incentives on all categories of e-vehicles, i.e., two-wheelers, three-wheelers, four-wheelers, goods carriers, and electric rickshaws.

Owing to the above-mentioned instances and developments, rising government initiatives are expected to enhance demand in the market over the forecast period.

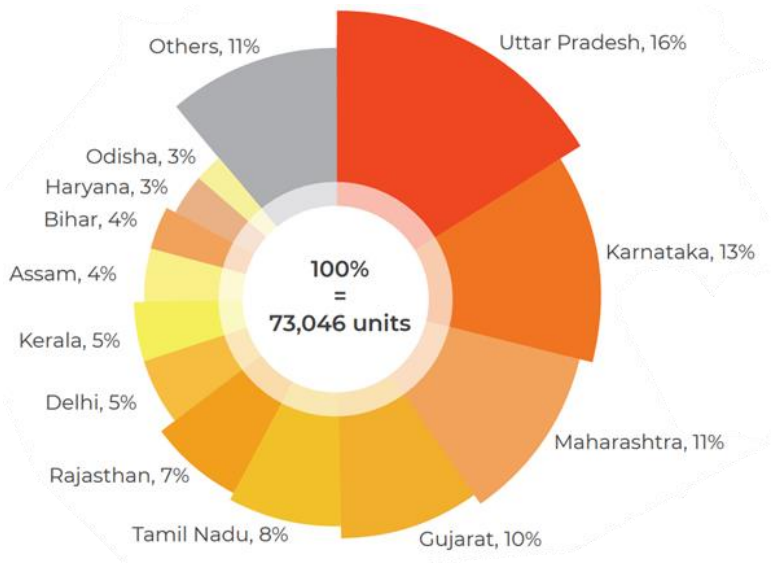


Source: Vahan Dashboard, Company Press Release, JMK Research Note: Sales figures represent EVs registered across 1,429 RTOs in 33 states/ UTs; Others include adapted vehicles, fork-lifts, goods carriers, omni bus, and trailer (agriculture) vehicles.

1. Segmentation by Geographical Data

1.1. Sales of EV in every State

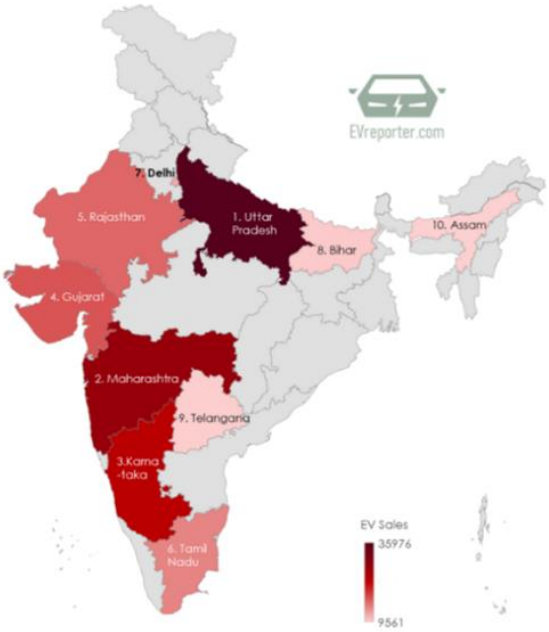
Among all the states and UTs, Uttar Pradesh retained its top spot of EV share with 16% of overall sales, followed by Karnataka with 13% share. Maharashtra fell to the third spot with 11% share, followed by Gujarat (10%), Tamil Nadu (8%), Rajasthan (7%) and Delhi (5%).



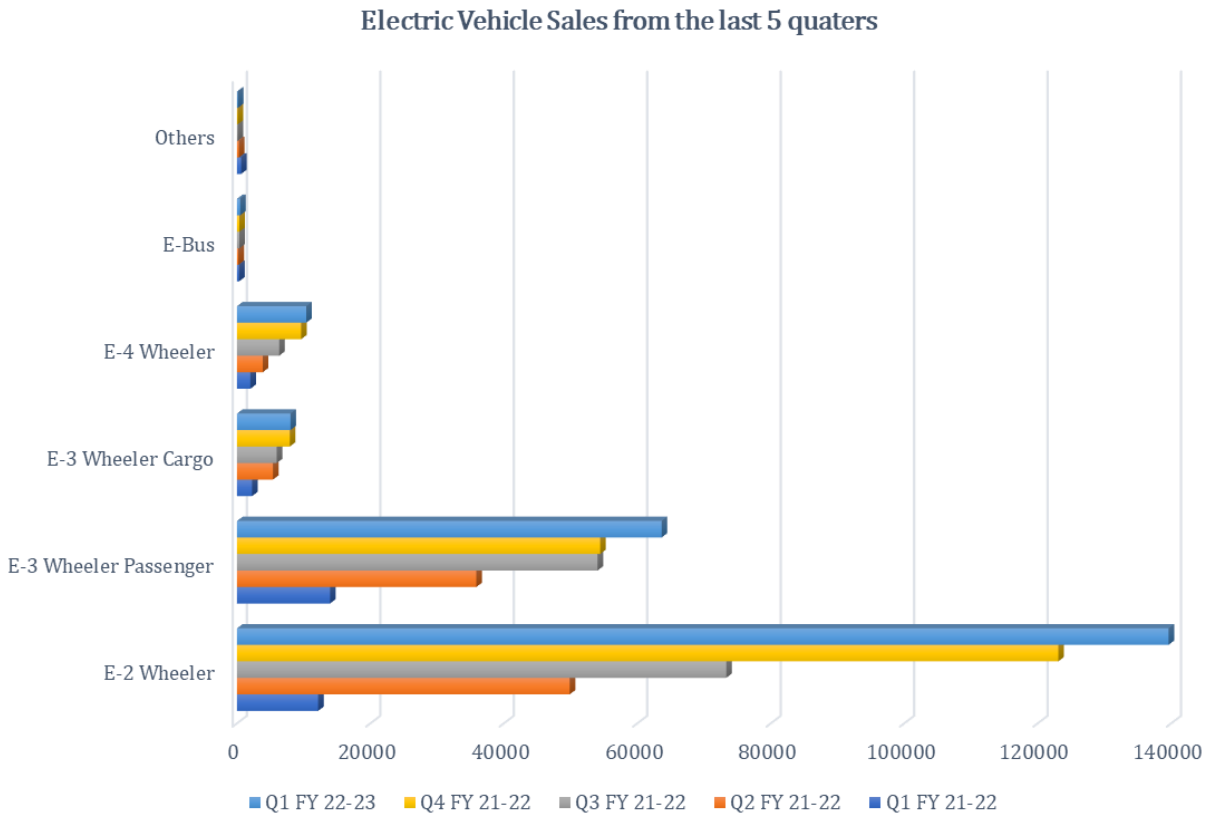
Source: Vahan Dashboard, Company Press Release, JMK Research Note: Sales figures represent EVs registered across 1,429 RTOs in 33 states/ UTs. Others include Chhattisgarh, Punjab, and other 14 states/UTs

1.2 Trend from Last 5 quarters (April 2021 to June 2022)

EV sales in India registered a Y-o-Y growth rate of 610% between the first quarter of FY 21-22 (31,315 units) and the first quarter of FY 22-23 (2,22,208 units). The total number of electric vehicles sold from Q2 Fy 21-22 to Q1 FY 22-23 (last 4 quarters) in India comes out to be 6,53,080 units.



State	EV's Sold	%Share
Uttar Pradesh	35976	16.3%
Maharashtra	27908	12.6%
Karnataka	23467	10.6%
Gujarat	17406	7.8%
Rajasthan	16237	7.3%
Tamil Nadu	14358	6.5%
Delhi	11945	5.4%
Bihar	10012	4.5%
Telangana	9670	4.3%
Assam	9561	4.3%
All Other States	44108	19.9%



Therefore from the above reports we can see that EV's are mostly preferred by people living in the Western and Southern part of India, where about 80% of the EV's are sold. In the hilly states of Northern India *(Jammu & Kashmir, Uttarakhand, Himachal Pradesh)* and The Easter states *(West Bengal, Jharkhand, Orissa)* along with the seven sisters *(except Assam which shows a considerable share of EV sales)* do not show a success with EV. One major reason behind this is the unavailability of Charging Stations in the Hilly and remote areas. It can be clearly seen that EVs are only successful in the metropolitan cities of India and in South India. Union territories such as *Lakshadweep, Andaman and Nicobar islands* do not show any EV sales due to lack of Charging stations; the same goes for *Jammu and Kashmir*. Also the states having the maximum area under forest such as *Madhya Pradesh, Mizoram, Arunachal Pradesh, Meghalaya, Manipur and Nagaland* also show similar trend with EV with some merely sales. States like *West Bengal, Jharkhand, Orissa, Punjab* which have a variety of geography have a very low contribution towards EV sales figures.

2. Segmentation by Psychographic Data

Psychographic segmentation considers the psychological aspects of consumer behaviour by dividing markets according to lifestyle, personality traits, values, opinions, and interests of consumers. Large markets like the fitness market use psychographic segmentation when they sort their customers into categories of people who care about healthy living and exercise.

2.1. The four psychographic segments of EV buyers

2.1.1. Prestige buyers:

These are the buyers who want the social currency of owning an EV. They're attracted to EV models that are flashy, high end, and unique. A recent Car and Driver headline caught my eye: New Study Says Expensive Cars Are Bought by Jerks Who Won't Yield. The author doesn't discuss EVs in the article, and there's no direct evidence that prestige EV buyers are jerks, but it's a fun read nonetheless.

Consumers are drawn to a luxury purchase because they seek the status and attention that comes with that product. There's often an element of exclusivity, or a first-mover factor, that comes into play. Perhaps there's even a "keeping up with the Joneses" component. If the Tesla brand is now floating in your head, that's because it's the quintessential EV for the prestige buyer. Tesla founder Elon Musk used a classic ladder-pricing approach by introducing the most luxurious and expensive models first. This created buzz around the brand and, whether intentional or not, it also created scarcity. Later, Musk introduced the more modestly priced Tesla Model 3. Just think about how customers would view the brand differently if the Model 3 was Tesla's most luxurious model, and its previously released EVs were bare-bones, affordable cars with limited range and performance.

2.1.2. Environmental buyers:

As the name implies, these EV buyers purchased their cars primarily to shrink their environmental footprint. Our data shows that many of these owners also have solar panels or buy green power and make other environmentally based decisions. EVs are most environmentally friendly in areas with lots of renewable energy. But according to the Forbes article Charging An Electric Vehicle Is Far Cleaner Than Driving On Gasoline, Everywhere In America, even in the most coal-based electric systems, EVs create less carbon dioxide than an equivalent ICE vehicle. Environmentalism also includes an element of pride and prestige for being green (environmentalists do show off, yes), but generally it's more intrinsic and focused on the current and future health of the community and planet. Environmental buyers show a willingness to pay more for an environmentally superior option,

whether for food, investment portfolios, cleaning products, or electricity. Messaging for environmental buyers should focus on creating a connection between driving an EV and specific environmental outcomes for their family and society. And the tone should be aspirational and positive.
Messaging for environmental buyers should create a connection between driving an EV and specific environmental outcomes for their family and community.

2.1.3. Irrational economic buyers:

This segment may be a bit confusing, but it's an important segment to understand in order to grow the early-adopter market. We call them irrational economic buyers because they focus on the dollar savings of EVs, but then gloss over the poor resale value of EVs compared to ICE vehicles. The Green Car Reports Article Beyond Tesla, electric cars lose value faster than other vehicles goes into detail about the value of used EVs.
Certainly, the core arguments for this segment are the direct savings from using electricity instead of gasoline, which can save up to 75% of normal fueling costs, as well as lower maintenance costs. Additional factors we heard in our research include never needing to go to gas stations, enjoying an exhilarating driving experience, and not needing oil changes. Overall, irrational economic buyers convince themselves of the value basis for purchasing an EV and being an early adopter, but they're also likely to be influenced by some environmental or prestige elements.

2.1.4. Rational economic buyers:

The final psychographic segment is the rational economic buyer. This person compares the overall costs of an EV to an equivalent ICE car. The word "equivalent" is important because many of today's EV buyers are foregoing their top model choice (crossover, SUV, truck, van) in order to be an early EV adopter, where there's little choice of model types (mostly sedans and hatchbacks). This type of buyer might manage a fleet of vehicles, where the economic decision is paramount. A fleet vehicle owner needs to consider operating costs, maintenance costs, vehicle longevity, charging infrastructure costs, and possibly environmental costs.
Because EVs cost more than their ICE equivalents by a decent margin, this group represents a very small percentage of current sales. But as the market moves from early adopters to early majority, EVs will need to compete economically.

2.2. How will things play out over the next five years and beyond?

So how will psychographic segmentation of the next set of EV buyers evolve? As more EV models enter the market, it will be interesting to see how buyer types shift. We think we'll continue to see environmental buyers, especially as battery range increases and new SUVs start to hit the market. We also predict that rational economic buyers will become an influential group as we move into the early- and late-majority phases of the diffusion of innovation curve. The next five years will be important because the overall EV market must grow fast enough to make EVs a profitable product for car companies. In our EVs won't sell themselves web conference, we explained how EVs will move through the curve as well as how the top Nissan EV salesperson in the US gets people to take the plunge.

Psychographic segmentation is useful for understanding buyers' rationale and enhancing the effectiveness of marketing campaigns by focusing on messages that resonate with key groups. You should couple this type of segmentation with demographics, where consumers fall on the curve, geography, attitudes, and behaviours. E Source, with partner Claritas, has developed robust EV segmentation approaches that can identify households that are more likely to want and buy EVs. Contact Us for more information.

This is the first of a series of blog posts we're developing on EVs and electrification. Stay tuned for topics such as EVs for low-income customers, the role of dealerships and salespeople, the importance of public charging infrastructure, and how to tackle range anxiety.

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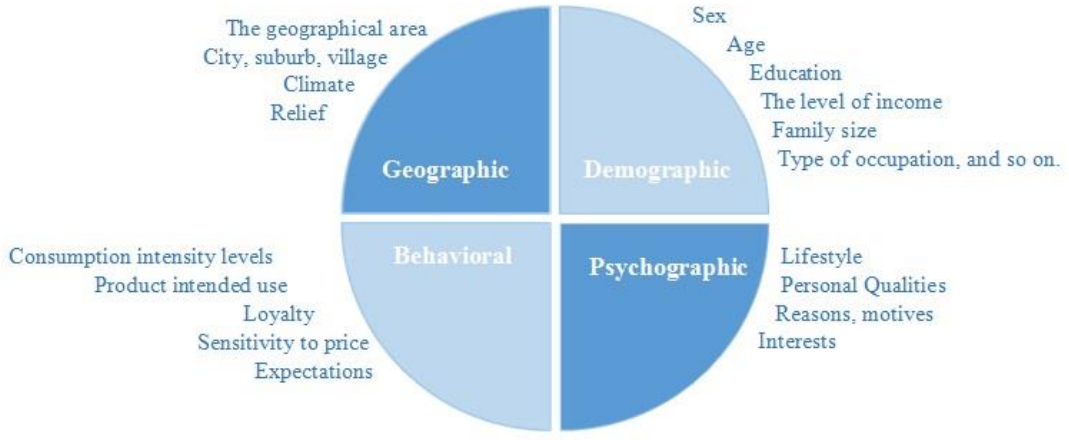


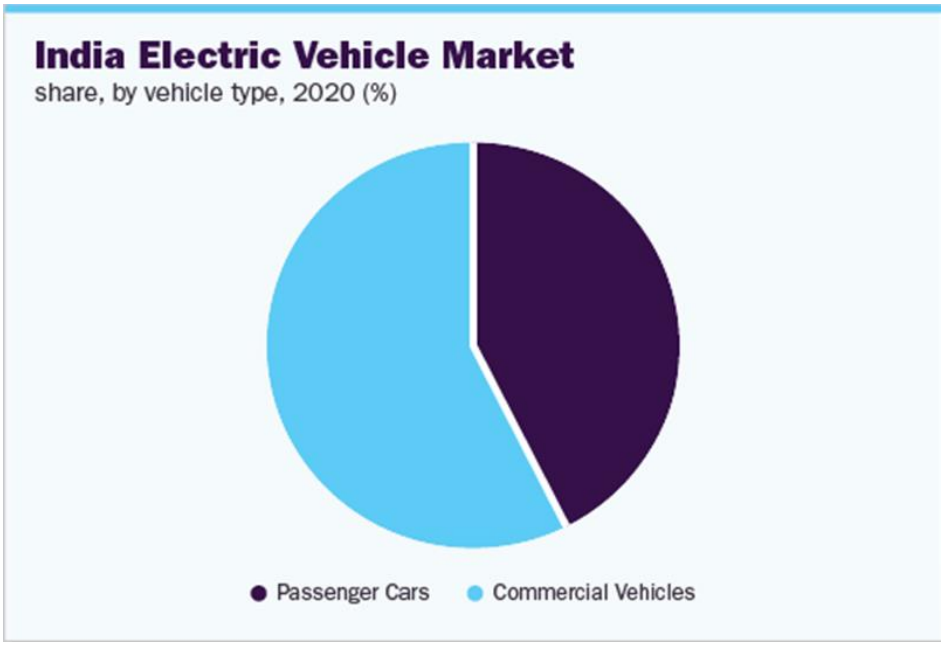
(Gaižutis A., 2001. Market segments)

3. Segmentation by Demographic Data

Demographic segmentation gives you an understanding of which customers are most likely to make purchases. This helps you outline who your most valuable customers are, and therefore who you need to target your marketing efforts towards. By tailoring marketing strategies to those customers who are most likely to make purchases, you increase the effectiveness of your marketing strategies whilst lowering your spendings. This means that demographic segmentation can help you increase customer loyalty, decrease spendings, and increase your ROI (return on investment).

3.1. Vehicle Type Insights

The commercial vehicle segment accounted for the largest share of around 57% of the overall market in 2020. The growth of the segment can be attributed to the continued introduction of electric light-duty commercial trucks and electric buses in the country. Electric buses are already gaining traction as the government is pursuing aggressive plans to have more and more electric vehicles plying on the roads to reduce vehicular pollution in major cities across the nation. Companies, such as Tata Motors, Mahindra and Mahindra Ltd, and Olectra Greentech Limited, are already offering electric light-duty commercial vehicles and electric buses in the country.

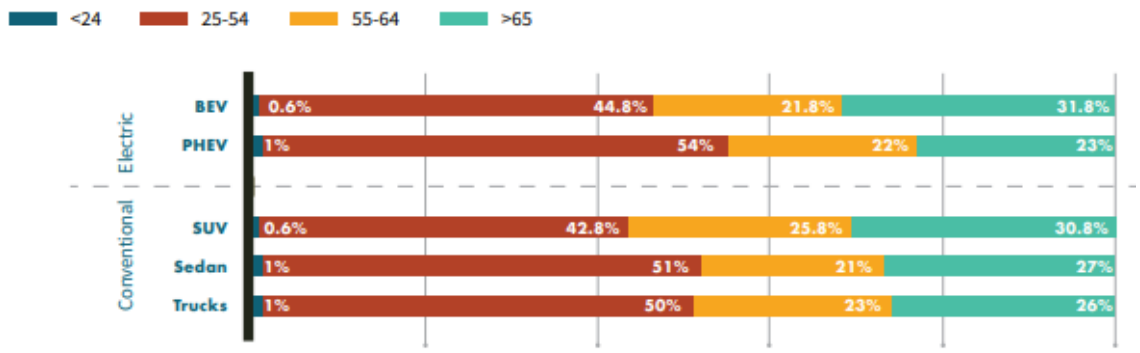


The passenger cars segment is projected to register a CAGR of over 106% over the forecast period. The diesel and gasoline-based passenger vehicle market is witnessing a shift toward electric passenger vehicles owing to increasing

investments by the government in EV infrastructure, along with tax benefits offered to consumers. For instance, the Indian government's National Electric Mobility Mission Plan (NEMMP) 2020 envisages promoting the adoption of hybrid vehicles and electric vehicles while achieving national fuel security.

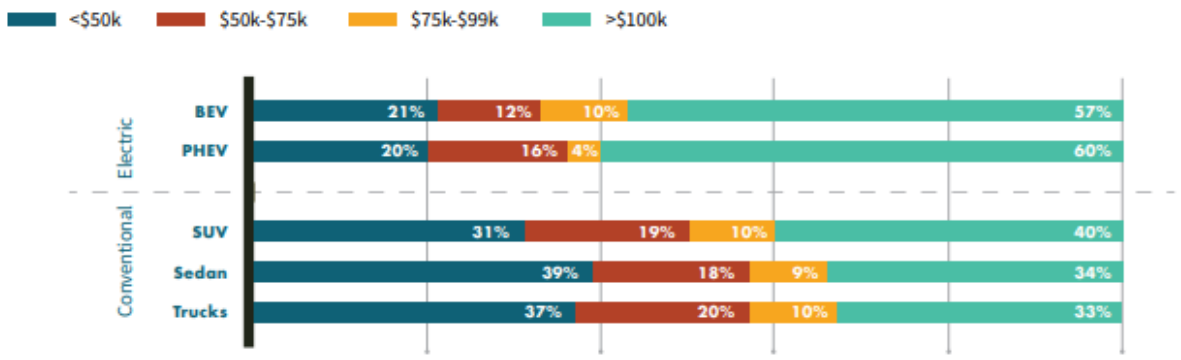
PEV buyers tend to follow the general trend of new car buyers. The dominant age group for PEV buyers across the board is 25-54 years old, according to Hedges Company's 2019 survey. The most dominant annual household income bracket amongst PEV buyers is "greater than $100,000." For conventional vehicles, buyers are almost evenly split between "less than $50,000" and "greater than $100,000" annual household income. The average household annual income of most EV owners is found to be between $125,000 and $150,000, according to the same survey.

FIGURE 1: SPLIT OF NEW CAR BUYERS BASED ON AGE GROUP (2019)



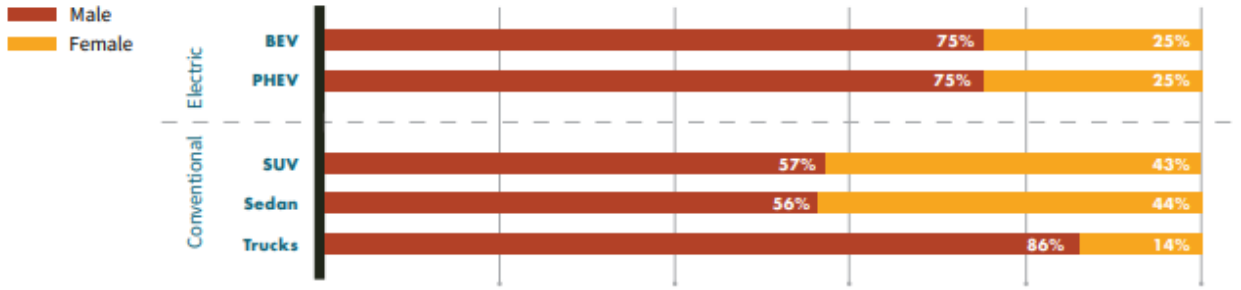
Source: "New Car Buyer Demographics 2020 (Updated)," Hedges & Company (rounded numbers used in some cases)

FIGURE 2: SPLIT OF NEW CAR BUYERS BASED ON ANNUAL HOUSEHOLD INCOME BRACKET (2019)



Source: "New Car Buyer Demographics 2020 (Updated)," Hedges & Company

FIGURE 3: SPLIT OF NEW CAR BUYERS BASED ON GENDER (2019)



Sources: "New Car Buyer Demographics 2020 (Updated)," Hedges & Company; Farkas et al., Electric Vehicle Ownership Factors, Preferred Safety Technologies, and Commuting Behavior in the United States

3.2. Key Companies & Market Share Insights

The key players that dominated the market in 2020 include Hyundai Motor India, Tata Motors, Mahindra & Mahindra Ltd, Audi AG, BMW AG, MG Motor India Pvt. Ltd., and Olectra Greentech Limited. These market players are offering a wide range of electric vehicles including passenger cars, light commercial vehicles, and electric buses. The companies are particularly focusing on introducing advanced and technology-driven products in the market. They are also pursuing strategic initiatives, such as mergers and acquisitions, and strategic partnerships and collaborations, to strengthen their position in the market. For example, in October 2020, Uber, a ride-hailing company, announced a partnership with Lithium Urban Technologies, an electric vehicle fleet operator in India.

The collaboration envisages the two companies deploying over 1,000 electric vehicles for Uber India's Rentals and Premier ser Some of the prominent players operating in the India electric vehicle market are:

•Audi AG
•BMW AG
•Hyundai Motor India
•Jaguar Land Rover Limited
•Mahindra & Mahindra Ltd
•Mercedes-Benz AG
•MG Motor India Pvt. Ltd.
•Olectra Greentech Limited
•Tata Motors
•Toyota Motor Corporation

3.3. Indian Electric Vehicle Market Report Scope

Market size value in 2021	USD 383.5 million
Revenue forecast in 2030	USD 152.21 billion
Growth rate	CAGR of 94.4% from 2021 to 2030
Base year for estimation	2020
Historical data	2016 - 2019
Forecast period	2021 - 2030
Quantitative units	Revenue in USD Million, Volume in Units, and CAGR from 2021 to 2030
Report coverage	Revenue forecast, volume forecast, company share, competitive landscape, growth factors, and trends
Segments covered	Product, vehicle type
Country scope	India
Key companies profiled	Audi AG; BMW AG; Hyundai Motor India; Jaguar Land Rover Limited; Mahindra & Mahindra Ltd; Mercedes-Benz AG; MG Motor India Pvt. Ltd.; Olectra Greentech Limited; Tata Motors; Toyota Motor Corporation

4. Segmentation Based in Behavioral Data

4.1. EV Consideration is Healthy

Nearly 4 in 10 consumers are currently considering an EV for their next vehicle purchase, with Gen Z and Millennials leading the growth in consideration. However, when we dive further into asking consumers how certain they are on purchasing an electric vehicle, their intentions wane. Conversion from consideration to sales will be challenging as shoppers are still trying to solidify their decisions based on the purchase barriers holding them back.

4.2. Barriers to Adoption

What's interesting is that the top five barriers to electric vehicle adoption remain consistent when compared to our previous EV study in 2019. The good news is that some of these concerns are decreasing when compared to the previous results. Across consumers, anxiety is lowering around lack of charging stations, battery holding a charge and limited mileage range, as innovations in this segment address these concerns. However, costs including EV price and battery replacement are still high on the list of apprehensions for consumers.

4.3. Brand Loyalty and Content Marketing Pave the Path to Purchase

Brand loyalty is crucial to driving electric vehicle adoption. Our research asked respondents how likely they would be to purchase or lease from the same brand if their current brand produced only EVs after 2030. A whopping 84% of considerers said they would likely re-purchase from the same brand, while nearly 50% of Non-Considerers said the same. Most current brands have low to moderate brand awareness, as consumers are not savvy on what EVs are available in the marketplace. There is a massive opportunity for brands that want to win in the EV segment to invest in CRM, elevate brand trust, and maintain strong quality for the

consumers to stay with the brand. Start introducing consumers to any EV concept vehicles or upcoming EV launches to gear them up for your brand's future line-up.

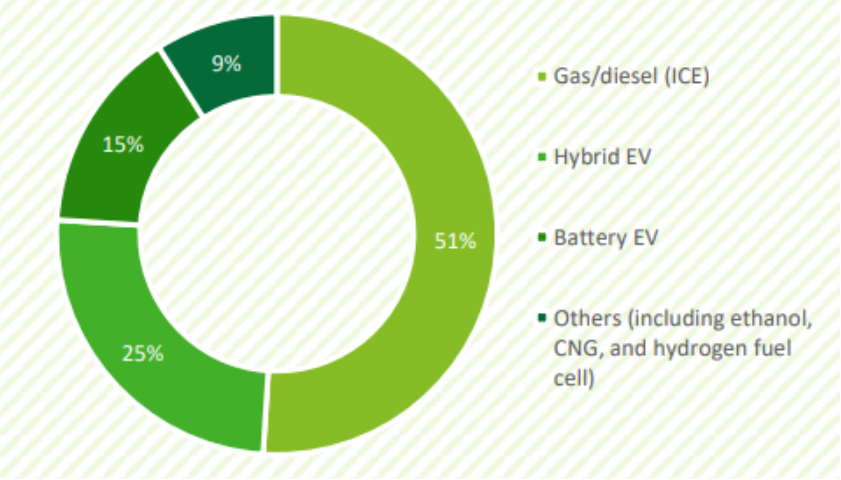
4.4. Consumer preference

Although, there have been significant developments in the electric mobility space, the perception of consumers is still not in favour of electric vehicles. Deloitte, through its Automobile Consumer Study 2020, surveyed 3022 consumers in India to understand opinions regarding critical issues in automobile sector.

• Over past few years, there has been decline in 2-3% of consumers who are unwilling to pay any more for either autonomous technologies or alternative engine technologies.

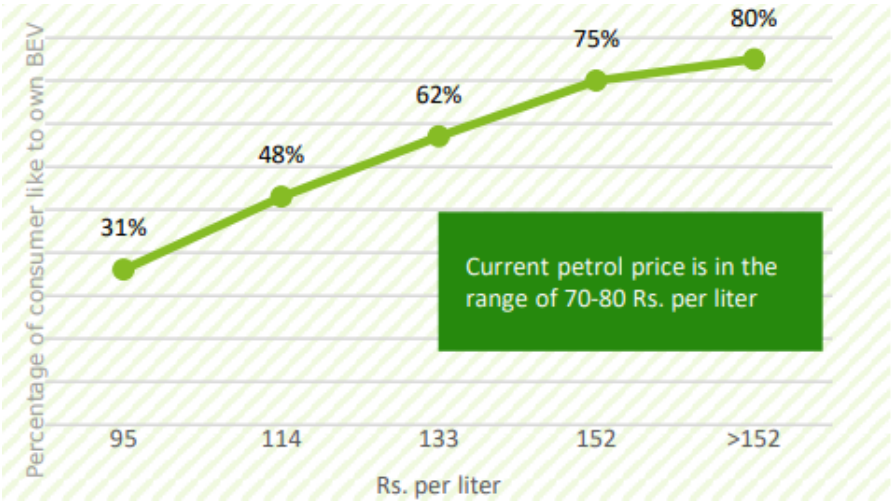
• Around 40% consumers preferred Electric vehicles (Battery/ hybrid) for their next vehicles. However, decision of buying an EV is dependent upon the price of fuel for ICE vehicle. Only when the fuel prices rise by an additional 40%-50% from the present level, it is expected that majority consumers will prefer electric vehicles over ICE.

Consumer preferences on their next vehicle purchase:



Source: 71 2020 Deloitte Automobile consumer Study

Consumer preference to own BEVs with change in petrol prices:



Policy and regulatory landscape:

Roles of various ministries in EV ecosystem:

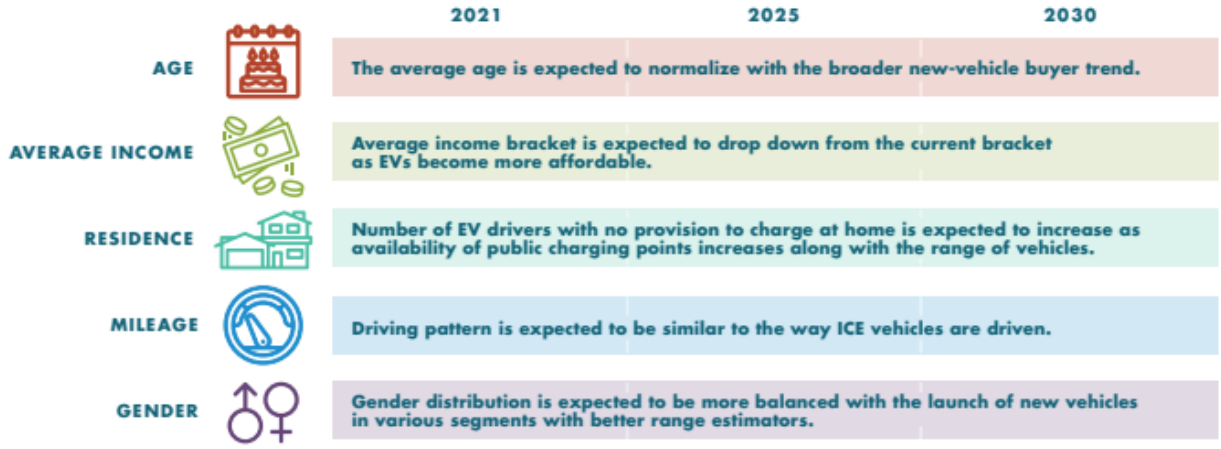
- **Ministry of Heavy Industries and Public Enterprises (MoHI&PE)**: To achieve the objectives of reduced emission and energy security, Department of Heavy Industries (DHI) has notified Faster Adoption and Manufacturing of (Hybrid and) Electric Vehicles in India (FAME) scheme, in March 2015.
- **Ministry of Road Transport and Highways (MoRTH):** The ministry is responsible for formulating policies and regulations pertaining to road transport. The Ministry also plays a key role in formulating non-financial incentives for promoting EVs by provisioning for parking infrastructure, priority lane access, etc.
- **Ministry of Power:** The ministry is responsible for perspective planning, policy formulation, processing of projects for investment decision, monitoring of the implementation of power projects, training and manpower development and the administration and enactment of legislation in regard to development of Power Sector.
- **Ministry of Housing and Urban Affairs (MoHUA):** MoHUA notified that residential and commercial complexes will have to allot 20% of their parking space for electric vehicle charging facilities.
- **Ministry of Finance**: MoF reduced the GST rates for the purchase of electric vehicles from 12% to 5% and announced income tax rebate of INR 1,50,000 on purchase of electric vehicles.
- **Ministry of Environment, Forest and Climate Change:** The ministry notified Draft Battery Waste Management Rules, 2020 to strengthen the ecosystem for handling and disposal of batteries across India.

- **Ministry of Science and Technology**: MoST is playing a key role in forming electric mobility standardization roadmap for India.

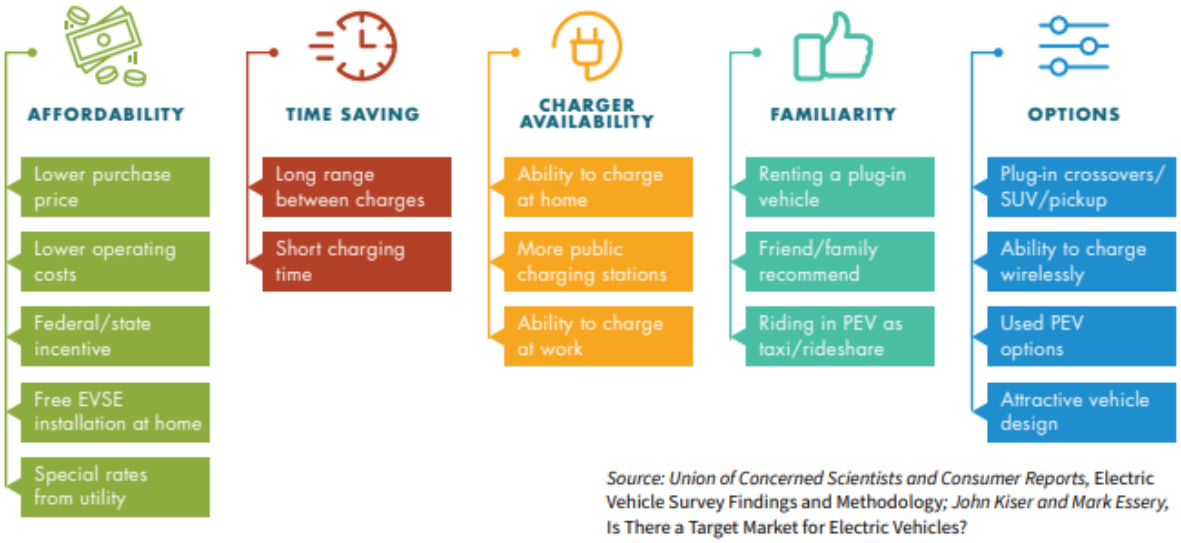
Conclusion:

With the depletion of fossil fuels and constant hike in fuel prices, there is a need for energy transition in vehicles in India. Govt has taken initiative to fight pollution levels by promoting EVs and giving subsidies on purchase. To boost its production, Govt has eased the FDI norms. Various emerging brands are launching EVs in India. The Government and manufacturers should join their hands to build the infrastructure and create positive environment for EVs. The respondents are aware of global climate conditions and are ready to change their preference from conventional to eco-friendly vehicles. Cost is an important factor while considering the purchase of EV.

Currently, EVs are predominantly sedans or hatchbacks, which may not cater to the requirement of SUV, truck, and minivan drivers. In a 2019 study, the Union of Concerned Scientists (UCS) and Consumer Reports reported a strong consensus (72%) that PEVs should be produced in other forms,48 so they may address the requirements of drivers of these vehicles.



Another key theme is that younger people between the age of 25 and 34 may not be able to afford EVs due to factors such as student debt, wage stagnation, and lack of access to home charging or at-home parking. Some report using public transportation to be more practical than owning a car. PEV buyers appear to value affordability by means of a lower purchase price, lower operating costs, and federal and/or state support, amongst others.



Source: Union of Concerned Scientists and Consumer Reports, Electric Vehicle Survey Findings and Methodology; *John Kiser and Mark Essery,* Is There a Target Market for Electric Vehicles?

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