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Case Study: Evaluation of Customer Disposition toward Electric Vehicles: A Paradigm Shift in Southern States of India

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Introduction:

The automotive industry is standing at the point of a transformative era, driven by the growing interest and adoption of electric vehicles (EVs).The landscape of automotive industry has undergoing a transformative shift globally, with electric vehicles (EVs) emerging as a sustainable alternative to traditional internal combustion engine vehicles. As concerns about environmental sustainability and the need for energy-efficient transportation intensify, the disposition of customers toward electric vehicles becomes a pivotal aspect of the ongoing mobility revolution.

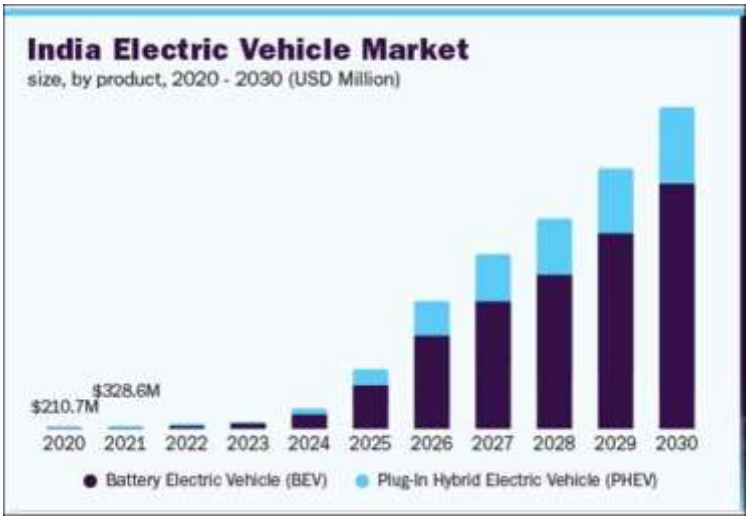
Customer disposition, in this context, refers to the complex interplay of attitudes, perceptions, preferences, and behavioral tendencies that individuals exhibit concerning electric vehicles. It encapsulates the myriad factors influencing the decision-making process, from awareness and knowledge about EVs to considerations of charging infrastructure, government policies, environmental consciousness, and the perceived benefits and challenges associated with electric vehicle adoption.

Understanding customer disposition toward electric vehicles is not merely an exercise in market analysis; it is a key determinant of the trajectory of sustainable transportation. As we embark on this exploration, it is essential to recognize the multifaceted nature of customer sentiments and the dynamic interconnections that shape the evolving landscape of electric vehicle acceptance.

This introduction sets the stage for a comprehensive journey into the minds of consumers, unraveling the intricate tapestry of beliefs, expectations, and considerations that influence their stance on electric vehicles. By delving into the nuances of customer disposition, we aim to shed light on the challenges and opportunities that lie ahead for manufacturers, policymakers, and stakeholders in the pursuit of a cleaner and more sustainable automotive future.

INDIA'S EV ECONOMY: THE FUTURE OF AUTOMOTIVE TRANSPORTATION

Electric vehicles (EVs) have gained global traction as cleaner alternatives, leveraging battery technology and an expanding charging network. In India, the third-largest automobile market globally, there's a collaborative push among manufacturers and policymakers to embrace greener options. The automotive sector, contributing 7.1% to India's GDP and a substantial employment provider, is witnessing a significant shift. Predictions suggest a 49% CAGR in India's domestic EV market from 2022 to 2030, with an annual target of 10 million sales by 2030. This growth is expected to generate around 50 million jobs. The government's 30% electrification target for the vehicle fleet by 2030 is supported by incentives, policies, and a notable boost in the FY24 Union Budget for EV production, hydrogen fuel adoption, and evolving technologies.



AN OVERVIEW OF THE LIFE-CYCLE APPROACH FOR VEHICLES

The study employs a well-to-wheel (WTW) life-cycle approach, comparing carbon emissions of electric vehicles (EVs) and conventional Internal Combustion Engine Vehicles (ICEVs). WTW encompasses the entire energy flow, from fossil fuel extraction to vehicle operation. The analysis covers the complete value chain for each power source. Figure 1 illustrates stages from fuel extraction to vehicle operation for both ICEVs and EVs, using gasoline as a reference for ICEVs. In ICEVs, the well-to-wheel approach comprises "well to tank," involving energy source extraction, fuel transport, and tank filling, and the second part of the approach contains"tank to wheel," involving energy utilization for vehicle motion.

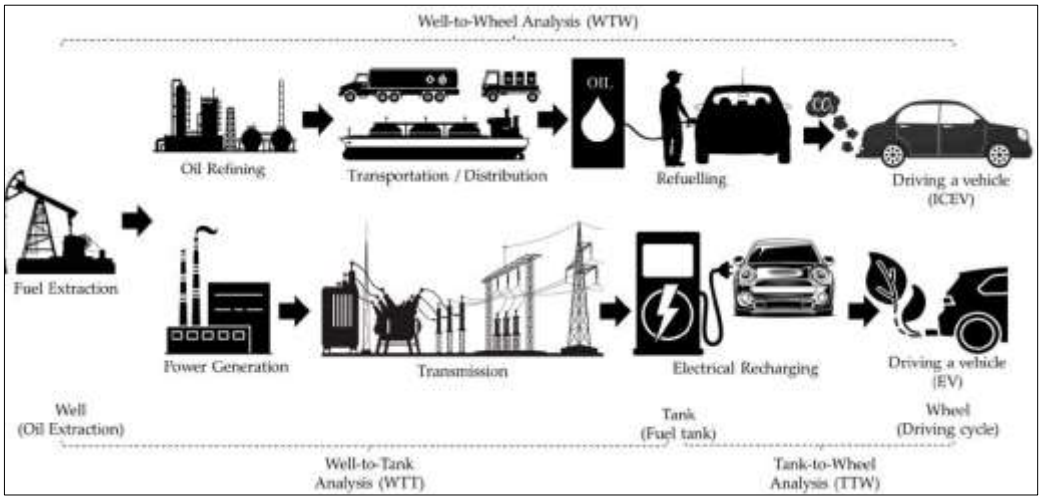


Figure : Life cycle system boundary for the well-to-wheel analysis of ICEV and EV

KEY FACTORS INFLUENCING CUSTOMER ADOPTION OF ELECTRIC VEHICLES (EV's)

As the automotive industry undergoes a transformative shift towards sustainable mobility, the adoption of electric vehicles (EVs) is increasingly influenced by a myriad of factors that cater to both functional and emotional needs of consumers. The following key factors play a crucial role in shaping customer preferences and decisions regarding EV adoption

Prominent Variable of likelihood for the Customer adoption towards EV's

• Drive Comfort

• Speed Performance

• Exterior/Interior Design

•Digital Dashboard Display

• Battery Life and Warranty Benefits

• Value for Money

• Eco-Friendly

• Battery charging stations

• Government subsidy

• Mobile application services

• Message Alert for on time maintenance and service reminders

• Staff hospitality on booking/s for maintenance services

• Technician attitudes before and after maintenance services

• Follow-up and on time delivery maintenance services

• Genuine replacement parts availability

INTRODUCTION- TO SOUTHERN INDIA AUTOMOTIVE LANDSCAPE

In the dynamic automotive landscape of Southern India, the winds of change are blowing with the introduction of electric vehicles (EVs). This essay delves into the intricate tapestry of customer sentiments surrounding electric vehicles in the southern region, shedding light on the factors that shape attitudes and perceptions.

The South Indian states continue to lead in sales of EVs. With a strong focus on manufacturing, this region has been able to garner investments and contribute to substantial development across the EV value chain. The region has maintained a strong focus on enhancing its R&D capabilities and has been a catalyst in creating synergies within the ecosystem by involving multiple stakeholders as the segment grows.

STATE-WISE SALES ANALYSIS

Andhra Pradesh			
EV segments	**2022-23**	**2021-22**	**Y-o-y growth**
2-W	29,004	13,428	116%
3-W	637	376	69%
PV	999	622	61%
Total	**30640**	**14426**	**112%**

	Karnataka		
EV segments	**2022-23**	**2021-22**	**Y-o-y growth**
2-W	102,912	41,290	149%
3-W	4,780	2,947	62%
PV	5948	1838	224%
Total	**113,640**	**46,075**	147%

Kerala			
EV segments	**2022-23**	**2021-22**	**Y-o-y growth**
2-W	44,399	11,404	289%
3-W	2,714	1,205	125%
PV	5,051	2,230	127%
Total	**62,164**	**14,839**	**252%**

	Tamil Nadu		
EV segments	**2022-23**	**2021-22**	**Y-o-y growth**
2-W	66,773	35,679	84%
3-W	2,739	1,860	47%
PV	4,574	1,186	286%
Total	**73,086**	**38,725**	**89%**

These four states made up around 22% of the total EV sales in FY 2022-23, highlighting the substantial

Impact that South India has on the EV ecosystem in India.

Note: 1. Data for Telangana is not included in state-wise analysis. 2. Data extracted from VAHAN dashboard as on 11 May 2023 3. PVs include light motor vehicle and light passenger vehicle (as categorized in VAHAN Dashboard)

Kerala leads in electric PV sales in India with a 2% penetration rate, followed by Karnataka (1.1%) and Tamil Nadu (1%). The national average for electric vehicle (EV) penetration in passenger vehicles (PVs) is 0.8%. In electric two-wheelers (E2Ws), Delhi has the highest penetration at 9.6%, followed by Karnataka (8.6%) and Kerala (7.3%). The average E2W penetration rate in India is 4.5%.

Bangalore is emerging as a technology hub for green mobility solutions, providing services like sustainable mobility, energy infrastructure, battery management systems, and charging solutions. This growth is driving commercial applications in the fast-moving consumer goods (FMCG) and logistics sectors.

Andhra Pradesh has an effective incentive scheme for charging infrastructure, and several states, including Andhra Pradesh, Telangana, Kerala, and Karnataka, offer concessional power tariffs for EV charging connections. This comprehensive approach is fostering enhanced growth in the entire EV ecosystem in the region.

Key factors driving growth in South India

Tamil Nadu: The state, accounting for the third largest vehicular population of India, significantly contributes to the sector, The state policy aims at garnering investments amounting to INR 50,000 crore and generating 1.5 lakh jobs. The state has become one of the leading EV manufacturing hubs over the last five years and has signed several memoranda of understanding (MOUs) with an investment interest of around INR 24,000 crore and employment potential of 48,000 jobs

Kerala

The state government actively works towards aligning the development of e-mobility with the state's manufacturing ecosystem, especially for EV components: Creating and developing adequate charging infrastructure, Promoting indigenous manufacturing

Andhra Pradesh

The state government has identified electric mobility as a robust growth driver for the coming years: Charging infrastructure by providing financial incentives for private charging stations and hydrogen generation (and refuelling infrastructure)

Telangana

With a vision to make Telangana a hub for electric vehicles and energy storage systems, Making the state an attractive investment destination within the EV sector by providing support for manufacturing (including but not limited to extending tailor-made benefits to mega and strategic projects). Promoting research and development by setting up EV research hubs and various Centers of Excellence

Karnataka

The state has the ecosystem to expedite the growth of the automotive sector in terms of manpower, robust R&D capabilities and manufacturing expertise. Attracting investments of INR 31,000 crore and creating employment opportunities for 55,000 persons (both from the demand and supply side)

Current Landscape:

Southern India, comprising states like Karnataka, Tamil Nadu, Kerala, Telangana, and Andhra Pradesh, is witnessing a burgeoning interest in electric vehicles. This surge is not merely a shift in transportation preferences but a transformation in the way individuals perceive and interact with their vehicles.

Awareness and Perception:

One of the fundamental pillars shaping customer sentiments is the level of awareness about electric vehicles. In urban pockets, where information flows more freely, there exists a palpable enthusiasm and curiosity about EVs. In contrast, rural areas are still catching up, with a notable lack of awareness. Bridging this gap becomes paramount, necessitating robust awareness campaigns tailored to diverse demographics.

Charging Infrastructure:

The disposition of customers is intricately linked to the accessibility and convenience of charging infrastructure. A common sentiment echoed is the apprehension about the limited charging stations, especially in remote areas. Expanding this infrastructure strategically is imperative to alleviate concerns and instill confidence among potential EV adopters.

Government Policies and Incentives:

As we gauge the sentiment of customers, government policies and incentives emerge as significant influencers. The allure of subsidies and tax benefits has a positive impact on customer disposition. However, the complex nature of these policies raises the need for simplification and transparency, ensuring a smoother transition to electric vehicles.

Concerns and Considerations:

Customer sentiments are not devoid of concerns. Range anxiety, perceived maintenance costs, and a perceived lack of model variety contribute to a sense of hesitation among potential EV buyers. Addressing these concerns requires a collaborative effort from manufacturers, policymakers, and industry stakeholders. Technological innovations, transparent communication, and diversification of EV models are key strategies to assuage these concerns.

Indian consumers are in the paradigm shift to electric vehicles.

As India accelerates its shift to electric cars, emerging consumer needs include features, charging infrastructure, channel preferences, and flexible ownership models. The country is poised for an electric vehicle (EV) future, with 70% of tier-one Indian car consumers expressing willingness to consider an electric car for their next vehicle-well above the global average of 52%. Despite recent growth in the internal-combustion engine (ICE) vehicle market, the rapid transition to electrification signals a decisive turning point. Government initiatives, such as the Faster Adoption and Manufacturing of Electric

Vehicles (FAME) scheme, and city-level access regulations for ICE vehicles underscore the commitment to expedite EV adoption, driven by global climate policies.

As EV accessibility increases, with ambitious electrification targets from car manufacturers and cost parity achieved with ICE vehicles, the EV market is set to reach 10-15% penetration by 2030. Insights from our December 2022 India Mobility Consumer Survey, encompassing 1,200 participants, highlight consumer sentiments and concerns about electric vehicles, emphasizing sustainability, charging infrastructure, and the evolving online purchase journey.

Most consumers support electric vehicles (EVs) because sustainability is becoming more and more essential.

The consensus among consumers is that the switch to electric vehicles will accelerate. When it comes to their next automobile, the great majority of individuals are considering electric cars (EVs). Of those, full battery electric vehicles are clearly preferred (49%) over plug-in hybrid electric vehicles (21%). (Exhibit 1). These choices are in line with our findings from our study on electric two-wheelers, which indicated that 86% of customers would think about purchasing an EV as opposed to 69% who would think about purchasing an ICE vehicle. A number of causes is fueling this desire for EVs; among the main advantages of driving an EV, prospective buyers cite its impact on the environment (67%), cheaper total cost of ownership (26%), and less engine noise (26%).

Exhibit 1: Most of Indian Customers say next car they purchase will Electric.

Befits of BEV's and PHEV'S	
Better for the environment	39%
Ability to reduce emissions	28%
Lower cost of ownership	26%
Decreased engine noise	26%
Convenience of charging	22%
Cutting-edge technology	21%
Driving performance	20%
Design, look, and feet	19%
Stability of resale value	16%

In fact, Indian customers' preference for electric vehicles (EVs) is being influenced by their general concern for sustainability, which is their top priority when it comes to purchasing cars and using transportation. In fact, 75% of Indians are beginning to modify (or have already modified) their behavior and consumption habits in response to sustainability concerns. This indicates that sustainability is having a growing impact on consumer decisions across the board in India. The most prevalent of these improvements include trying more often (20%), favorably endorsing sustainable goods and services (23%), and interacting with and being more devoted to sustainable companies (27%).

People rank affordability and sustainability as two of the top five criteria when considering a car, after safety, brand, and price the requirement for carbon-free vehicles is evident in Exhibit 2: When buying a new automobile, buyers choose sustainability over safety, brand, and total cost of ownership.

Exhibit 2:Key purchase criteria for next private car, share of car considerers, in %

Technology-enabled safety	27%
Vehicle brand	26%
Total cost of ownership	25%
Purchase price	25%
Sustainability	21%
Driving performance or acceleration	21%
Cutting-edge technology in vehicle	20%
Battery safety	20%
Battery life	20%
Charging speed	19%

Accelerate adoption are highly influenced by long-term test-drives and Convenient charging points. Amidst the growing momentum towards sustainable mobility, legitimate concerns have surfaced that may impact adoption, such as battery safety and longevity, purchase cost, charging duration, and technological dependability. Increasing the availability of charging stations is one of the main things driving the transition to electric vehicles. The perceived preparedness of the charging infrastructure is low: over 75% of consumers surveyed believe that India is still lacking in charging stations (Exhibit 3).

Exhibit 3: The perception of charging infrastructure preparedness is poor, and when selecting a charging point, speed, affordability, and safety are crucial considerations.

Key decision factors for choosing a charge point, share of car considerers, %

Charging speed	49%
Charging data	41%
Safety of charging location	28%
Charger service reliability	25%
Proximity to destination	22%
Charge point operator brand	20%
Ability to reserve in advance	20%
Already having downloaded app or account set up	15%
Established partner of OEM	15%
Payment options	14%
Fast technical support	14%

Indian consumers show nearly equal preference for public (58%) and home charging (42%), despite acknowledging the latter's cost-effectiveness and convenience. While 55% have home charging access, 30% can upgrade their setup. Surprisingly, limited home charging access doesn't deter two-thirds of consumers from considering EVs, with 38% citing insufficient nearby charging infrastructure. Investment in both public and home charging is crucial. Factors guiding public charging choices include speed (49%), costs (41%), and location safety (28%). People are willing to pay 10-20% more for fast charging convenience. The test drive experience plays a pivotal role for potential EV buyers. For skeptics, 24% consider it a tipping point in their purchase journey, suggesting OEMs implement long-term test rides for customer comfort. Vehicle safety improvements, enhanced servicing infrastructure, rising fuel prices, and a better understanding of EV total cost of ownership are identified as key factors driving increased EV adoption.

The shift to electric vehicles will alter the car-purchasing process.

As the EV transition unfolds, the car buying and selling landscape in India is undergoing a dramatic shift. Over 70% of consumers initiate their car purchase journey online, with about 40% willing to make online purchases. However, 90% still seek a physical touchpoint with an OEM or dealer, especially for individual interactions like test-drives, services, questions, or negotiations.

Preference for engaging with OEMs directly is evident across touchpoints, signaling the rise of hybrid direct-to-consumer models. Car dealers continue to play a pivotal, albeit evolved, role in the overall journey.

Flexible ownership options are gaining popularity, with 79% still preferring outright purchases. Gradually, consumers are exploring leasing, subscriptions, and pay-per-use models for increased flexibility and convenience. Shifting ownership preferences create new market opportunities, with consumers globally willing to switch brands for flexible vehicle purchase options. The evolving landscape emphasizes the need for market players to adapt.

In the vibrant landscape of Southern India, the automotive industry is experiencing a paradigm shift with the rise of electric vehicles (EVs). This case study delves into the evaluation of customer disposition toward electric vehicles in the region, exploring key questions that illuminate the factors influencing adoption and perceptions.

QUESTIONS:

1. What is the current awareness level among customers towards purchase of EV's?
2. How does charging Infrastructure Impact Customer Decisions concerning purchase of EV's?
3. What role do government policies towards EV's play in shaping customer disposition?
4. What are the primary concerns regarding electric vehicle adoption?
5. How does Environmental Consciousness Impact Customer Choices concerning purchase of EV's?

REFERENCES

https://www.grantthornton.in/globalassets/1.-member_firms/india/assets/pdfs/evolution_of_the_electric_vehicle_industry_in_south_india_09_June_2023.pdf

Imthiyaz Ahmed .M & Dr. D. Ayub Khan Dawood(2020) Customer Satisfaction of Indian Electric Cars in the Light of Green Marketing Strategies, International Journal of Advance Study and Research Work IJASRW (2581-5997)/ Special Issue ICROIRT-2020/September 2020

Ahmad Al-Buenain & Saeed Al-Muhannadi (2021), The Adoption of Electric Vehicles in Qatar Can Contribute to Net Carbon Emission Reduction but Requires Strong Government Incentives Vehicles 2021, 3, 618–635. https://doi.org/10.3390/vehicles3030037

Dr. V. Vidhya A & Renuga Devi. R B (2023), A Study on Consumer Preference and Satisfaction towards Electric vehicles with Reference to Coimbatore City, International Journal of Research Publication ISSN 2582-7421 and Reviews, Vol 4, no 5, pp 2382-2389 May 2023

Abhishek Kumar & Giri Gundu Hallur, Driving the electric vehicle revolution in India: case study of TATA NEXON, PJAEE, 17 (6) (2020) PalArch's Journal of Archaeology of Egypt/Egyptology

Elena Higueras-Castillo, Vedant Singh and Virender Singh "Factors affecting adoption intention of electric vehicle: a cross-cultural study" Environment, Development and Sustainability, Springer Publication, https://doi.org/10.1007/s10668-023-03865-y

Udit Chawla and Rajesh Mohnot (2022) "Factors Influencing Customer Preference and Adoption of Electric Vehicles in India: A Journey towards More Sustainable Transportation" Sustainability 2023, 15, 7020. https://doi.org/10.3390/su15087020, https://www.mdpi.com/journal/sustainability

Silvana Secinaro, Davide Calandra, Federico Lanzalonga & Alberto Ferraris (2022) Electric vehicles' consumer behaviours: Mapping the field and providing a research agenda, Journal of Business Research 150 (2022) 399–416, https://doi.org/10.1016/j.jbusres.2022.06.011