Understanding Vehicle Purchase Behaviour: Electric vs. Conventional Vehicles

[1]Shubham Mapari, [2] Swaraj Gawade , [3]Dhananjay Satav, [4]Divya Gurphale

[1]Student,Pharate Patil Management Institute,
[2]Student,Pharate Patil Management Institute,
[3]Student,Pharate Patil Management Institute,
[4]Student,Pharate Patil Management Institute

Abstract

This research examines and compares the purchase behaviour of Electric Vehicle (EV) buyers and Non-EV (ICE vehicle) buyers among residents of Pune, with the objective of identifying the key factors influencing adoption decisions in one of India's most prominent automotive hubs. As global and national mobility systems increasingly shift toward sustainable transportation, understanding city-specific consumer behaviour has become essential for accelerating EV adoption.

The study is based on primary data collected from 133 respondents representing diverse demographic backgrounds in Pune. It evaluates levels of EV awareness, perceptions of economic feasibility, infrastructure availability, environmental concern, and future purchase intentions. The results highlight a notable contradiction: although 44.4% of respondents report high awareness of EVs and 90.2% indicate interest in purchasing an EV in the future, only 17.3% currently own EVs exclusively.

Inadequate charging infrastructure emerges as the most critical barrier, cited by 40.6% of respondents, outweighing even high purchase cost concerns. While a majority of respondents acknowledge government incentives (69.2%) and environmental advantages (45.8%), significant uncertainty remains regarding the Total Cost of Ownership (TCO), with 58.2% unsure about long-term financial benefits. Improvements in charging infrastructure, extended driving range, and faster charging technology are identified as the most influential motivators for adoption.

The findings provide practical insights for policymakers, vehicle manufacturers, and infrastructure providers to reduce the gap between EV awareness and actual adoption, thereby supporting Pune's transition toward sustainable electric mobility.

Keywords:Electric Vehicles (EVs), Consumer Preference Analysis, Infrastructure Readiness, Green Transportation, Urban Mobility, Pune Region

1. Introduction

The global automobile industry is undergoing a fundamental transformation as Electric Vehicles (EVs) increasingly replace traditional Internal Combustion Engine (ICE) vehicles. This shift is driven by growing environmental concerns, rapid technological advancement, rising fuel costs, and supportive government policies. The transition represents not only a technological change but also a broader reconfiguration of urban transportation systems.

India, currently the world's third-largest automobile market, has set ambitious goals for electric mobility under the National Electric Mobility Mission Plan (NEMMP), targeting substantial EV penetration by 2030. Government initiatives such as the Faster Adoption and Manufacturing of Electric Vehicles (FAME) scheme, along with state-level incentive programs, aim to promote EV adoption through subsidies, tax benefits, and

infrastructure development.

Pune provides a highly relevant context for studying EV adoption behaviour. Often referred to as the "Detroit of India," the city hosts major automotive manufacturers including Tata Motors, Mahindra Electric, and Bajaj Auto. Pune also has a large, educated workforce—particularly in the IT and engineering sectors—and relatively high environmental awareness compared to many other Indian cities. These characteristics position Pune as an ideal setting for analysing consumer responses to emerging mobility technologies.

Despite favourable policies and rising awareness, EV adoption remains slower than expected. Understanding how EV buyers differ from Non-EV buyers in terms of awareness, perceptions, economic considerations, infrastructure concerns, and environmental attitudes is therefore critical. This study seeks to answer key questions such as: What factors most strongly influence EV purchase decisions? Why does high awareness not translate into higher adoption? What changes could encourage Non-EV users to shift toward electric mobility?

By analysing responses from 133 Pune residents across various demographic segments, this research provides empirical insights into consumer behaviour related to EV and Non-EV purchases. The findings contribute to existing literature on sustainable transportation in emerging economies and offer actionable recommendations for stakeholders involved in India's electric mobility ecosystem.

2. Literature Review

A review of existing literature on EV adoption reveals a complex interaction of economic, technological, infrastructural, environmental, demographic, and policy-related factors influencing consumer behaviour. Studies conducted in both global and Indian contexts provide valuable theoretical and empirical foundations for understanding EV purchase decisions.

Theoretical Perspectives

Consumer adoption of EVs has commonly been analysed using frameworks such as the Theory of Planned Behaviour (TPB), the Technology Acceptance Model (TAM), and Diffusion of Innovation Theory. TPB emphasizes the role of attitudes, perceived social pressure, and perceived control in shaping purchase intentions. TAM highlights perceived usefulness and ease of use as key determinants of technology acceptance, especially among urban and technologically inclined consumers. Diffusion of Innovation Theory explains how EVs spread from early adopters to the mainstream based on factors such as relative advantage, compatibility, complexity, and observability.

Economic Considerations

High initial purchase cost is consistently identified as one of the strongest barriers to EV adoption. However, multiple studies indicate that when fuel savings, reduced maintenance costs, and government incentives are considered, EVs can be economically competitive over their lifecycle. In the Indian context, subsidies, tax exemptions, and reduced registration charges have been shown to positively influence purchase intentions. Innovative financing options such as low-interest loans and battery leasing models further enhance affordability for middle-income consumers.

Infrastructure and Range Anxiety

Lack of charging infrastructure and concerns about driving range remain major obstacles to EV adoption. Studies show that cities with well-developed charging networks experience higher adoption rates. In India, limited public charging stations and inadequate home-charging facilities, particularly in apartment complexes, significantly restrict adoption. Charging time compared to conventional refuelling also affects consumer perceptions, although advancements in fast-charging technology are gradually reducing these concerns.

Environmental and Social Factors

Environmental awareness plays a crucial role in shaping positive attitudes toward EVs, especially among educated urban consumers. Social influence, including peer adoption, word-of-mouth communication, and media exposure, further strengthens acceptance. Visible use of EVs within social networks often increases trust

and reduces perceived risk.

Technology and Performance
Modern EVs offer advantages such as instant torque, smoother driving experience, and lower noise levels. However, concerns about battery life, resale value, and long-term reliability persist. Advanced technological features, including regenerative braking and connected vehicle technologies, appeal particularly to younger and tech-savvy consumers.

Demographic and Market Factors
Research indicates that younger consumers, individuals with higher education levels, and middle-to-upper income groups are more inclined toward EV adoption. Brand reputation, after-sales service quality, and warranty coverage significantly influence purchase decisions. Government policies at both central and state levels play a decisive role in shaping adoption patterns through incentives and infrastructure investment.

Research Gap
Most existing studies focus on developed markets or analyse EV adoption in isolation rather than comparing EV and Non-EV buyers within the same urban context. Limited research examines Pune specifically, despite its importance as an automotive and technological hub. This study addresses this gap by offering a city-specific, comparative analysis of EV and Non-EV purchase behaviour among Pune residents.

3. Objectives of the Study
1. To compare the demographic characteristics, awareness levels, and purchase decision factors of EV and Non-EV buyers in Pune.

2. To identify the key barriers and motivating factors influencing EV adoption, with emphasis on infrastructure, cost perceptions, and environmental awareness.

3. To evaluate consumer perceptions regarding EV economics, infrastructure adequacy, and future adoption intentions, and to provide recommendations for stakeholders.

4. Hypotheses of the Study

- **H1:** Environmental consciousness has a significant positive influence on willingness to adopt EVs among Pune residents.

- **H2:** Inadequate charging infrastructure and high initial cost are the most significant barriers preventing EV adoption.

- **H3:** Higher awareness of government incentives and EV technology positively influences purchase intention.

5. Scope of the Study

- **Geographical Scope:** Pune city and metropolitan region.

- **Demographic Scope:** Respondents across various age groups, income levels, educational backgrounds, and occupations.

- **Vehicle Scope:** Two-wheelers and four-wheelers, including EV owners, Non-EV owners, mixed owners, and prospective buyers.

- **Time Scope:** Current attitudes, recent purchases, and future intentions over the next 2–10 years.

6. Problem Statement

Despite supportive government policies, environmental benefits, and long-term economic advantages, EV adoption in Pune remains lower than expected. A clear gap exists between high awareness levels and actual ownership. Understanding the factors responsible for this gap is essential to encourage wider adoption and support sustainable urban mobility.

7. Research Methodology

- **Research Design:** Descriptive and analytical

- **Approach:** Quantitative with limited qualitative inputs

- **Sampling Method:** Convenience sampling

- **Sample Size:** 133 respondents

- **Data Collection Tool:** Structured questionnaire (25 questions)

- **Data Collection Method:** Online survey using Google Forms

8. Results, Observations, and Findings

8.1 Demographic Profile Analysis

The demographic distribution of respondents provides essential context for interpreting EV adoption trends in Pune and understanding variations in awareness, perception, and purchase behaviour across different consumer groups.
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Age Distribution:
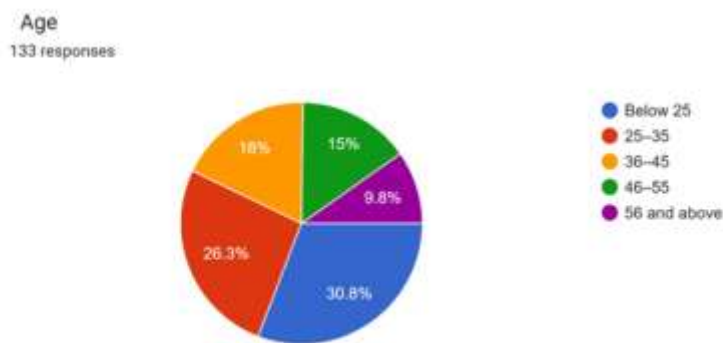
The study gathered responses from 133 individuals spanning a wide range of age groups. The age-wise distribution, as shown in the pie chart, reveals that respondents below 25 years constitute the largest segment, representing 30.8% of the total sample. Participants aged between 25 and 35 years form the next largest group at 26.3%, followed by those in the 36–45 age bracket, accounting for 18%. Additionally, 15% of respondents fall within the 46–55 age group, while 9.8% are aged 56 years or above.

This pattern highlights a strong representation of younger and middle-aged individuals in the survey. Since these groups are generally economically active, digitally engaged, and more receptive to new technologies, the findings of this study largely capture the viewpoints of consumers who are more likely to influence and adopt emerging mobility solutions such as Electric Vehicles. Consequently, the demographic structure of the sample is particularly well-suited for analysing EV adoption behaviour in an urban context like Pune.

Gender Distribution:
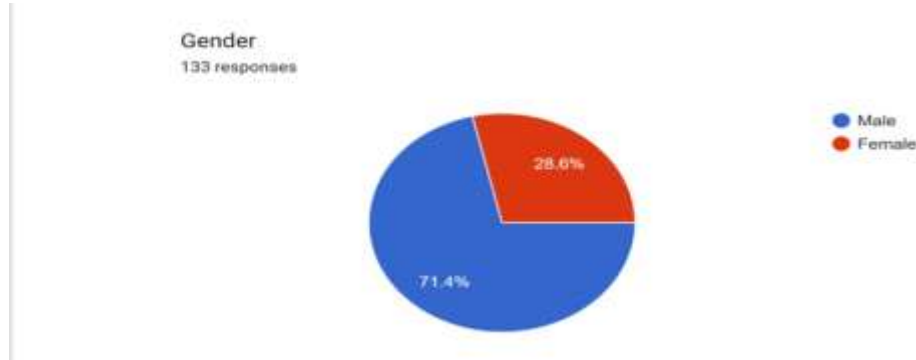
The pie chart presents the gender-wise composition of the respondents. Male participants form a dominant share of the sample, accounting for 71.4% of the total responses, whereas female respondents constitute the remaining 28.6%. This distribution reflects a clear gender imbalance in the sample, with males representing more than two-thirds of the surveyed population.
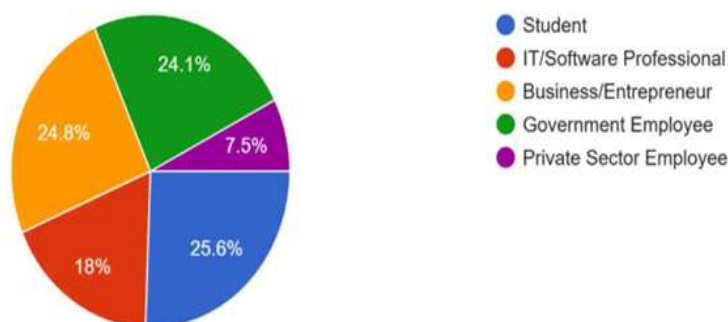
Educational Qualification:
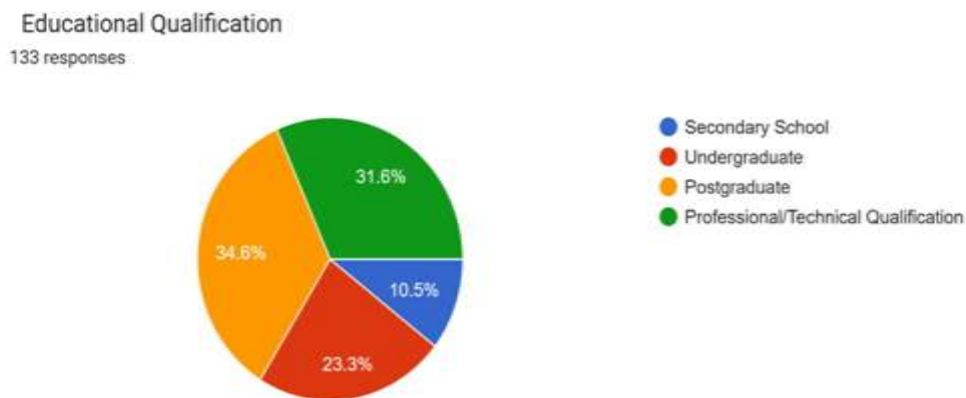
The pie chart illustrates the educational background of the respondents across four categories. A substantial share of participants, 34.6%, have completed postgraduate education, highlighting a strong presence of highly educated individuals in the sample. Close behind, 31.6% of respondents hold professional or technical qualifications, indicating considerable representation from individuals with specialized skills or vocational training. Additionally, 23.3% of the participants have attained an undergraduate degree. In contrast, only 10.5% of respondents reported having education limited to the secondary school level.

Overall, the findings indicate that the sample is predominantly composed of individuals with higher education or professional credentials, while a relatively small proportion falls within the lower educational category.

Occupational Profile:

Occupation

133 responses

- Student
- IT/Software Professional
- Business/Entrepreneur
- Government Employee
- Private Sector Employee

The pie chart displays the occupational profile of the respondents classified into five distinct groups. Students represent the largest segment of the sample at 25.6%. This is closely followed by respondents involved in business or entrepreneurial activities, who account for 24.8%, and government employees, comprising 24.1% of the total. IT and software professionals form 18% of the respondent group. Private sector employees constitute the smallest share, representing only 7.5% of participants.

Overall, the distribution appears fairly even across most occupational categories, with a slightly higher concentration of students and self-employed individuals, while representation from the private sector remains comparatively low.

Monthly Household Income Distribution:

Monthly Household Income

133 responses

- Below ₹30,000
- ₹30,000–₹60,000
- ₹60,001–₹1,00,000
- ₹1,00,001–₹2,00,000
- Above ₹2,00,000
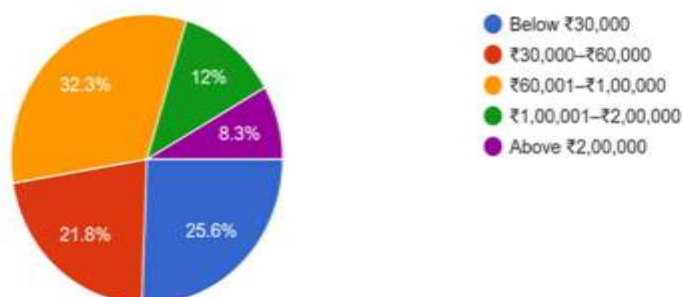
The pie chart represents the monthly household income distribution of the respondents across five income categories. The highest proportion of participants, 32.3%, reported a household income ranging between ₹60,001 and ₹1,00,000 per month. This is followed by 25.6% of

respondents whose monthly household income is below ₹30,000. Additionally, 21.8% of the sample falls within the ₹30,000 to ₹60,000 income bracket.

Households earning between ₹1,00,001 and ₹2,00,000 per month account for 12% of the respondents, while only 8.3% reported a monthly income exceeding ₹2,00,000. Overall, the income profile indicates that most respondents belong to low- to middle-income groups, with comparatively fewer participants representing higher-income households.

**8.2 Vehicle Ownership and Purchase Patterns**
Current Vehicle Ownership Status:
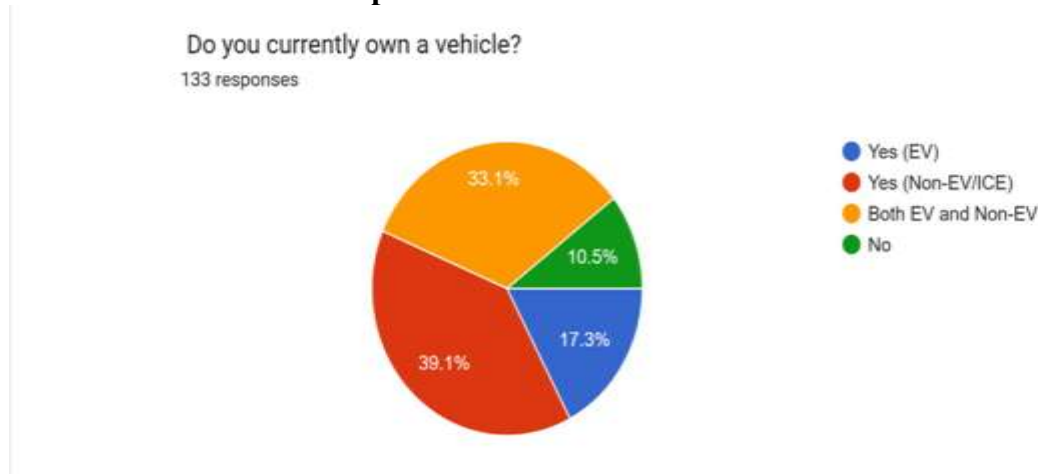
The vehicle ownership pattern reveals that 39.1% of the respondents currently possess only non-electric (internal combustion engine) vehicles. In comparison, 17.3% reported exclusive ownership of electric vehicles. A notable 33.1% of participants indicated that they own both electric and non-electric vehicles, while 10.5% stated that they do not any vehicle at present.

These findings indicate that although conventional vehicles continue to dominate ownership, electric vehicle adoption is gradually increasing. The substantial proportion of respondents owning both EVs and non-EVs reflects a transitional stage in consumer behaviour, where individuals are beginning to integrate electric mobility alongside traditional transportation options.

Vehicle Type Distribution:
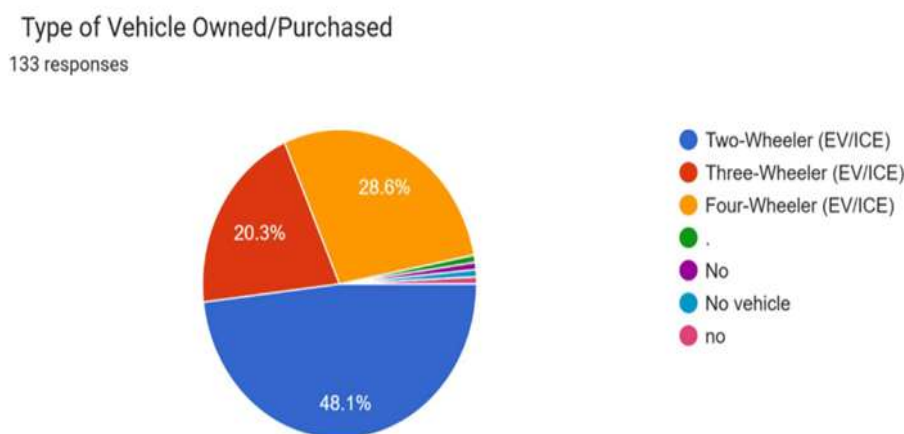
The findings show that two-wheelers, whether electric or internal combustion engine based, are the most commonly owned or purchased vehicle type among respondents, accounting for 48.1% of the total. This is followed by four-wheelers (EV/ICE), which are owned by 28.6% of participants. Three-wheelers represent 20.3% of the responses. Only a minimal number of

respondents reported not owning any vehicle, indicated through responses such as "No" or "No vehicle."
Overall, the results suggest a clear inclination toward two-wheelers, likely influenced by factors such as lower purchase cost, better fuel efficiency, and greater convenience for daily travel within urban environments.

Year of Most Recent Vehicle Purchase:

Year of most recent vehicle purchase
133 responses

- Within the last 1 year
- 1–3 years ago
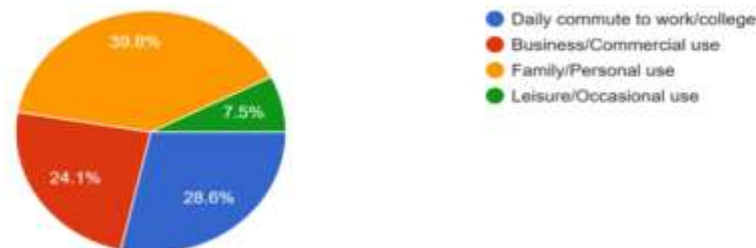- 3–5 years ago
- More than 5 years ago
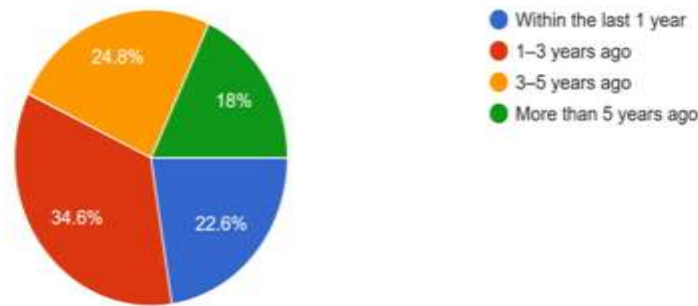
The survey of 133 respondents assessed how recently participants had purchased their most recent vehicle. The findings show that a large majority, 82%, had made a vehicle purchase within the past five years. Among them, 34.6% reported buying a vehicle between one and three years ago, 24.8% indicated a purchase made three to five years ago, and 22.6% had acquired a vehicle within the last year. In contrast, only 18% of respondents stated that their most recent purchase occurred more than five years ago.

These results point to a relatively high frequency of vehicle replacement or upgrading among respondents, suggesting an active vehicle market and a consumer base that regularly evaluates newer mobility options.

Primary Purpose of Vehicle Purchase:

Primary purpose of vehicle purchase
133 responses

- Daily commute to work/college
- Business/Commercial use
- Family/Personal use
- Leisure/Occasional use

Analysis of vehicle purchase purpose indicates that personal or family use is the most common reason for ownership, reported by 65 respondents, accounting for 48.9% of the sample. Daily commuting to work or educational institutions follows closely, with 43 respondents (32.3%). Business or commercial use was cited by 19 participants (14.3%), while leisure or occasional usage was reported by only 6 respondents (4.5%).

Together, personal and daily commuting purposes account for 81.2% of total vehicle usage, which aligns well with the functional strengths of electric vehicles. Typical urban travel distances, generally ranging between 20 and 50 kilometres per day, fall well within the operating range of most EVs—approximately 80–150 km for two-wheelers and 200–400 km for four-wheelers. This suggests that, although range anxiety remains a common concern, it may not

accurately reflect the actual mobility needs of most users.

The segment using vehicles for business or commercial purposes represents a distinct category with different decision-making priorities. For these users, factors such as operating cost efficiency, vehicle reliability, and reduced downtime play a critical role, indicating the need for customized EV value propositions that highlight total cost of ownership benefits and features specifically designed for commercial applications.

Key Factors Influencing Last Purchase Decision:

Key factor influencing your last vehicle purchase decision

133 responses
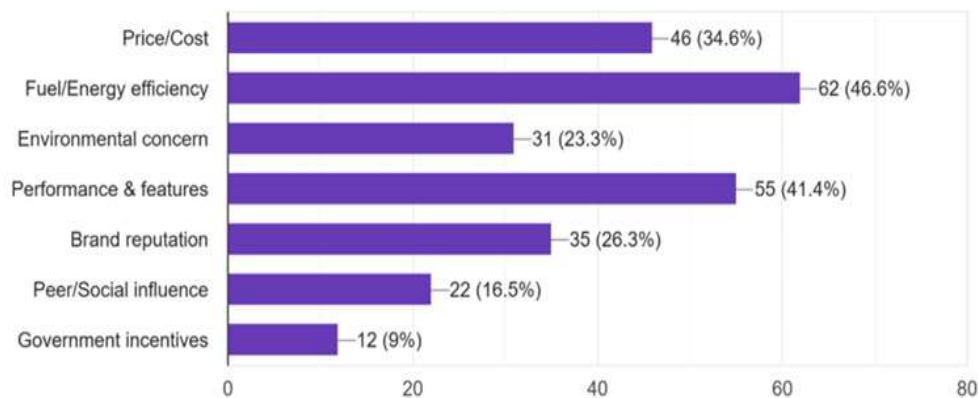
The bar chart highlights the primary factors that shaped respondents' most recent vehicle purchase decisions. Fuel or energy efficiency emerged as the most influential consideration, reported by 46.6% of participants, indicating that running costs and energy consumption are key priorities for buyers. Performance and vehicle features followed closely, influencing 41.4% of respondents, which reflects the importance placed on functionality, comfort, and technical specifications.

Price or overall cost was identified as a deciding factor by 34.6% of respondents, showing that affordability continues to play a significant role in purchase decisions. Brand reputation influenced 26.3% of buyers, while environmental concern was cited by 23.3%, suggesting that brand image and ecological awareness are relevant but secondary to more practical considerations.

Factors such as peer or social influence (16.5%) and government incentives (9%) were among the least influential, indicating that personal preferences and vehicle-related attributes have a stronger impact on purchase behaviour than external social pressure or policy-driven incentives.

8.3 EV Awareness and Knowledge Levels
EV Awareness Rating:

How would you rate your awareness of Electric Vehicles?

133 responses
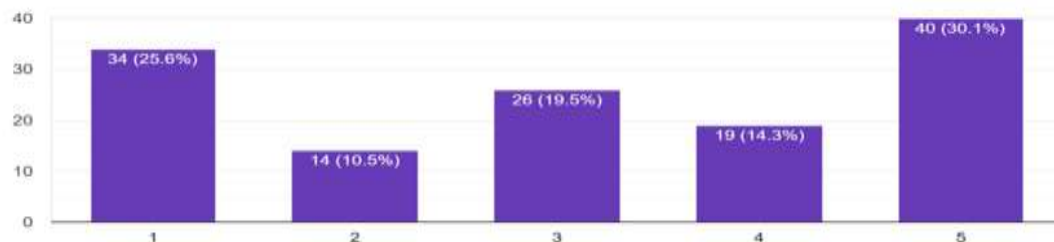
The chart presents respondents' self-assessed levels of awareness regarding electric vehicles on a five-point scale. The largest proportion of participants, 30.1%, rated their awareness at the highest level (5), reflecting strong familiarity or understanding of EVs. In contrast, 25.6% of respondents selected the lowest rating (1), indicating that a considerable segment of the sample perceives itself as having very limited knowledge about electric vehicles.

Mid-range awareness levels were also observed, with 19.5% of respondents rating their awareness at level 3 and 14.3% at level 4, while 10.5% selected level 2. Taken together, the results reveal a broad spread of awareness levels, suggesting that although a notable group is well-informed about EVs, knowledge across the respondent pool remains uneven.

Government Subsidy and Incentive Awareness:

Are you aware of government subsidies and incentives for EVs?
133 responses
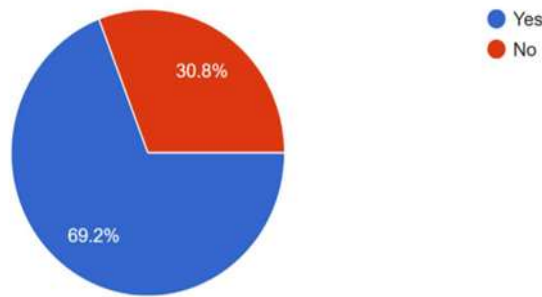
The pie chart depicts respondents' awareness of government-provided subsidies and incentive schemes related to electric vehicles. A substantial majority of participants, 69.2%, reported being aware of such financial support measures. However, 30.8% of respondents indicated that they were not aware of these government initiatives.

Although the overall level of awareness appears relatively high, the findings highlight a noticeable information gap among a significant segment of the population. Strengthening communication and outreach efforts regarding EV-related incentives may help improve consumer awareness and encourage higher adoption of electric vehicles.

8.4 Environmental Perceptions and Attitudes

Agreement with "EVs are Environmentally Friendly":

To what extent do you agree: "EVs are environmentally friendly compared to non-EVs."
133 responses
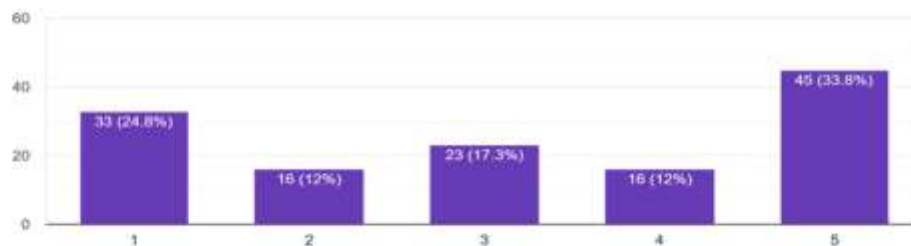
The bar chart illustrates respondents' views on the statement *"Electric vehicles are environmentally friendly when compared to non-electric vehicles,"* measured using a five-point Likert scale. The largest share of respondents, 33.8%, strongly agreed with the statement, reflecting a positive perception of the environmental advantages associated with EVs. Conversely, 24.8% of participants strongly disagreed, indicating the presence of considerable skepticism or concerns about the true environmental impact of electric vehicles.

Responses were more moderate among the remaining participants, with 17.3% expressing a neutral opinion by selecting the midpoint (3). Ratings of 2 and 4 were chosen by an equal proportion of respondents, each accounting for 12% of the total. Overall, the distribution highlights a polarized perception, where a substantial segment of respondents either firmly supports or strongly questions the environmental friendliness of electric vehicles.

8.5 Economic Perceptions and Willingness to Pay

Willingness to Pay Higher Upfront Cost:

Would you be willing to pay a higher upfront cost for an EV compared to a non-EV?
133 responses

- Yes
- No
- Maybe
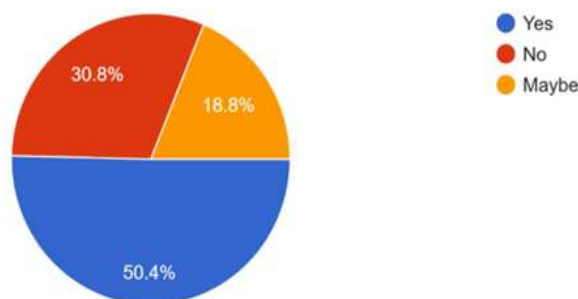
The pie chart shows respondents' readiness to pay a higher upfront price for an electric vehicle in comparison to a non-electric alternative. Slightly more than half of the participants, 50.4%, indicated a definite willingness to bear the higher initial cost, suggesting a positive inclination toward sustainable mobility despite price differences. In contrast, 30.8% of respondents stated that they would not be willing to pay more, highlighting that upfront cost continues to be a major constraint for a substantial section of potential buyers.
The remaining 18.8% selected the "Maybe" option, representing an undecided group whose

willingness to pay could be influenced by factors such as enhanced government incentives, improvements in EV technology, or clearer communication of long-term cost benefits.

Belief in Long-term Economic Benefits (TCO):

Do you think EVs are more economical in the long run (Total Cost of Ownership)?
122 responses

- Yes
- No
- Not sure
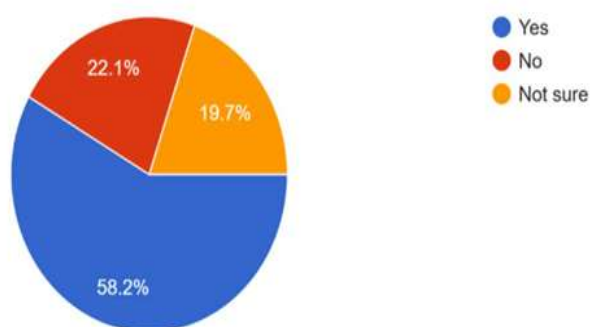
The pie chart depicts respondents' perceptions of the long-term economic advantages of electric vehicles, with a focus on total cost of ownership (TCO). A majority, 58.2%, believe that EVs are more cost-effective over time, reflecting a generally positive view of their long-term economic benefits. Conversely, 22.1% of participants disagreed, indicating skepticism regarding the financial viability of EVs. Additionally, 19.7% of respondents were uncertain, suggesting that a portion of the population lacks sufficient information to make an informed judgment.
Overall, while most respondents recognize the potential cost savings of EVs, a notable segment remains either doubtful or uninformed, highlighting the need for clearer communication regarding total cost of ownership and long-term economic benefits.

8.6 Primary Concerns and Barriers to EV Adoption

Biggest Concerns Regarding EVs:
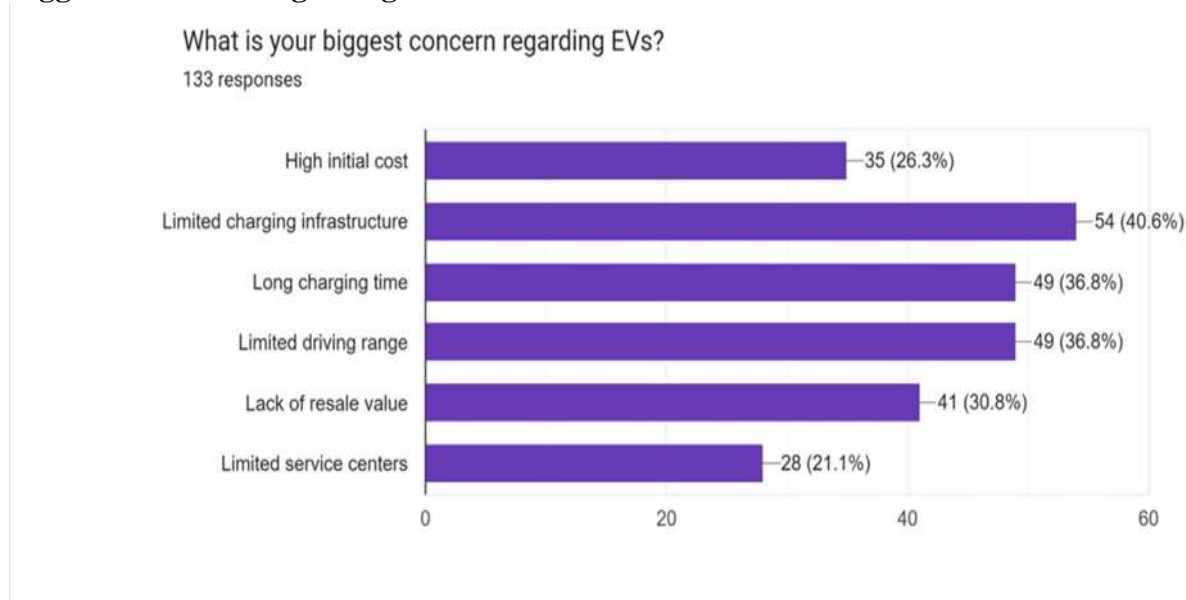
The bar chart presents the key concerns expressed by respondents regarding electric vehicles (EVs). The most frequently cited issue is the inadequacy of charging infrastructure, reported by 40.6% of participants. Close behind, 36.8% of respondents identified long charging times and limited driving range as major concerns, reflecting apprehensions about the convenience and practicality of EVs.

Financial factors also influence consumer hesitation, with 30.8% of participants concerned about low resale value and 26.3% citing the high initial purchase cost. The least commonly reported concern was the limited availability of service centers, mentioned by 21.1% of respondents.

Overall, these findings suggest that while cost-related factors remain relevant, practical limitations such as infrastructure and vehicle performance are more significant in shaping public perceptions of EV adoption.

Reasons for Not Choosing EV (Among Non-EV Buyers):
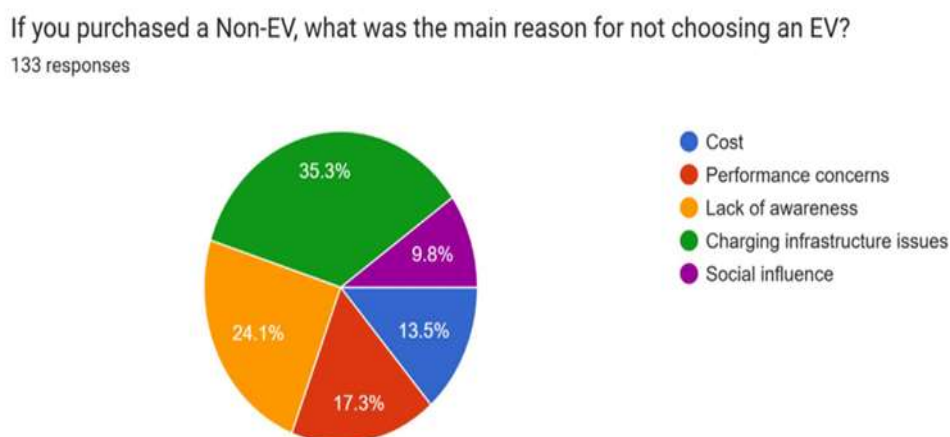
The pie chart presents the primary reasons respondents chose not to purchase an electric vehicle (EV). The most frequently reported barrier was inadequate charging infrastructure, cited by 35.3% of participants, highlighting that limited accessibility to charging stations continues to be a major obstacle to EV adoption. Lack of awareness was the next most common reason, reported by 24.1% of respondents, indicating that a significant portion of consumers still lacks sufficient information about electric vehicles.

Performance concerns influenced 17.3% of participants, while cost was a deciding factor for 13.5%. Social influence was the least cited reason, at 9.8%, suggesting that peer or societal pressure has minimal impact on the decision to avoid EVs.

Overall, these findings emphasize the importance of expanding charging infrastructure and improving consumer education to support broader adoption of electric vehicles.

8.7 Purchase Decision Influences and Information Sources
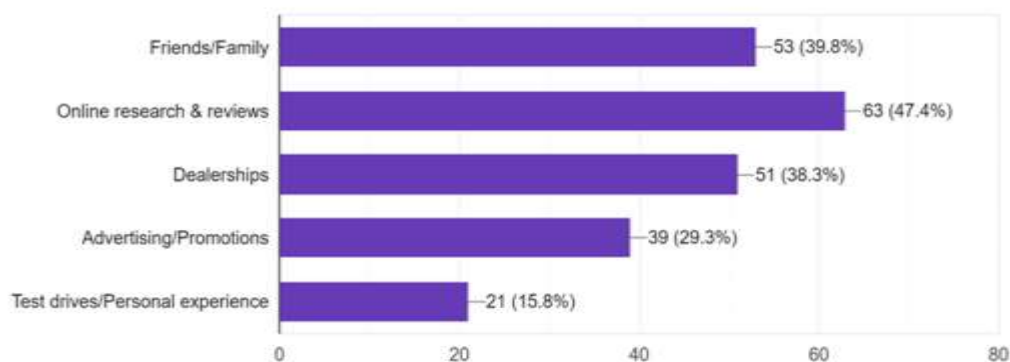
Primary Purchase Decision Influencers:
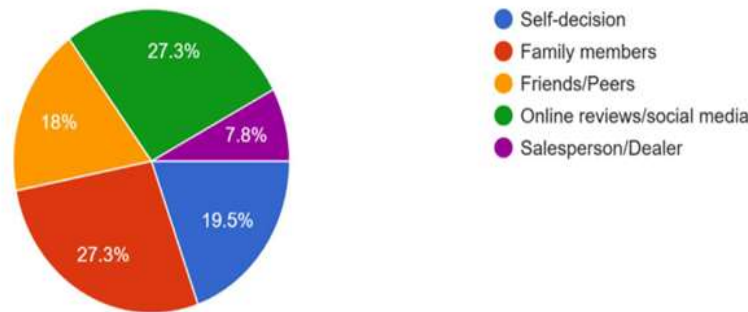
The pie chart depicts the primary sources that influence respondents' vehicle purchase decisions. The most impactful factors were online reviews and social media, as well as opinions from family members, each cited by 27.3% of participants. This indicates that both digital platforms and familial guidance significantly shape consumer behavior in the automotive market.

Self-decision was the next most influential factor, reported by 19.5% of respondents, showing that a considerable portion of buyers rely on their personal judgment. Close friends and peers influenced 18% of decisions, reflecting the role of immediate social networks. Salespeople or dealers were identified as the least influential source, with only 7.8% of participants citing them, suggesting a noticeable shift away from traditional sales influence toward digital and personal recommendations.

Information Sources Before Purchase:

The bar chart illustrates the main sources from which respondents gathered information before purchasing their vehicles. Online research and reviews were the most frequently used source, cited by 47.4% of participants, highlighting the increasing reliance on digital content and user-generated feedback in purchase decisions. Friends and family were the second most common source, mentioned by 39.8% of respondents, indicating the continued importance of personal networks in shaping consumer choices.

Dealerships were closely referenced by 38.3% of participants, suggesting that traditional sources remain relevant but are slightly less dominant than digital and personal channels. Advertising and promotional campaigns influenced 29.3% of respondents, reflecting the role of marketing in raising awareness. Test drives and firsthand experience were the least relied upon source, reported by only 15.8%, suggesting that direct interaction with the vehicle plays a smaller role in the early stages of information gathering.

8.8 Future Purchase Intentions and Adoption Timeline

Future EV Purchase Consideration:
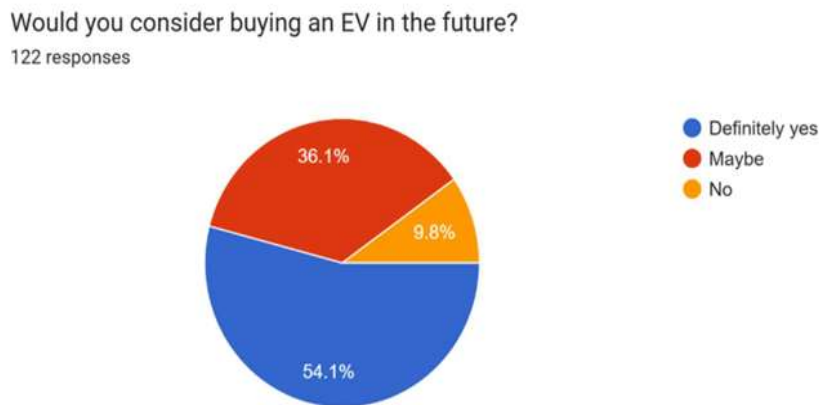
The pie chart illustrates respondents' willingness to consider purchasing an electric vehicle (EV) in the future. A majority of participants, 54.1%, indicated that they would "definitely" consider buying an EV, reflecting a strong and growing interest in sustainable mobility options. An additional 36.1% selected "maybe," representing a segment of consumers who are open to EV adoption but may still have reservations or require further information before making a decision.

Only 9.8% of respondents stated that they would not consider purchasing an EV, indicating relatively low resistance to electric mobility. Overall, the findings suggest a favorable outlook for the EV market, with a combined 90.2% of participants either committed to or potentially open to adopting electric vehicles in the near future.

8.9 Improvements Motivating EV Purchase:
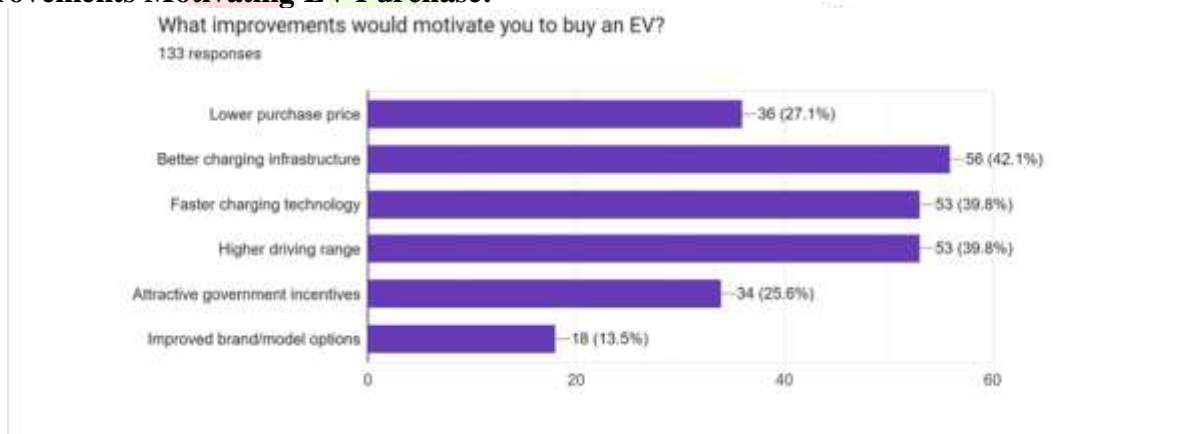
The graph highlights the key factors that would motivate respondents to purchase an electric vehicle (EV). The most frequently cited factor is improved charging infrastructure, chosen by the largest proportion of participants, indicating that accessibility and convenience of charging remain a top concern for potential buyers. Faster charging technology and extended driving range were also considered highly important, showing that performance-related improvements—such as shorter charging times and longer distances per full charge—are central to consumer priorities.

Lower purchase price and attractive government incentives were noted as relevant factors, though they were less influential compared to usability and performance considerations. Improved brand or model options received the fewest responses, suggesting that vehicle variety or aesthetics are not major barriers for most potential EV buyers.

Overall, the findings emphasize that enhancing infrastructure and charging capabilities should be the primary focus for encouraging broader adoption of electric vehicles.

8.10 Timeline for EV Mainstream Adoption in Pune:

How soon do you think EVs will become mainstream in Pune?
133 responses

- Within 2 years
- 3–5 years
- 6–10 years
- More than 10 years

24.8% / 18% / 26.3% / 30.8%
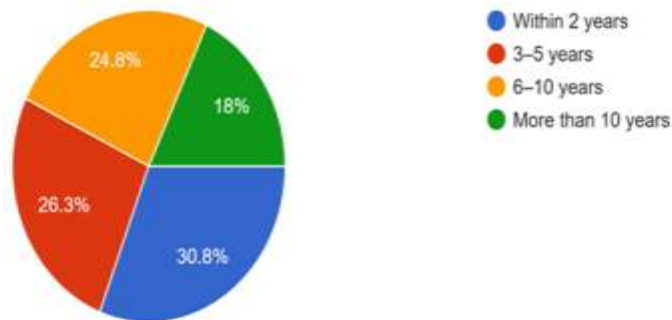
The pie chart illustrates respondents' expectations regarding the timeframe for electric vehicles (EVs) to become mainstream in Pune. The largest share, 30.8%, believes that EVs will achieve mainstream adoption within the next two years, reflecting strong optimism and anticipation for rapid market growth. However, 26.3% of participants expect this transition to take three to five years, while 24.8% foresee a six to ten-year timeline. These responses suggest a more cautious perspective among a significant portion of the population, acknowledging potential challenges related to infrastructure, affordability, and technological development that could slow adoption.

Only 18% of respondents believe that EVs will take more than ten years to become mainstream, indicating that long-term skepticism is relatively limited. Overall, the findings suggest that most people anticipate EVs becoming widely adopted in Pune within the next decade, with a notable concentration of optimism for adoption within the next five years.

8.11 Belief in Pollution Reduction Through EV Adoption:

Do you believe EV adoption in Pune will significantly reduce pollution levels?
133 responses

- Yes
- Maybe
- No

29.3% / 17.3% / 53.4%
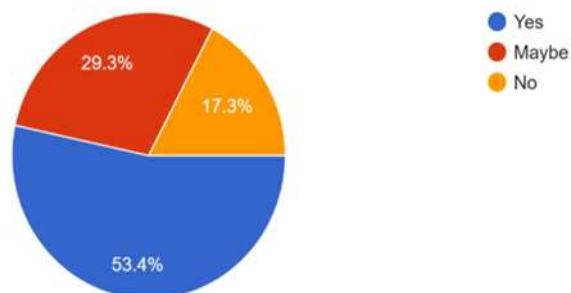
The pie chart titled *"Do you believe EV adoption in Pune will significantly reduce pollution levels?"* presents respondents' perceptions of the environmental impact of electric vehicle (EV) adoption in the city. A majority of participants, 53.4%, expressed confidence that EV adoption would substantially reduce pollution levels, reflecting a generally positive public outlook on the environmental benefits of electric mobility.

Meanwhile, 29.3% of respondents were uncertain, selecting "Maybe," indicating a segment of the population

that is open to the idea but requires more information or evidence. A smaller proportion, 17.3%, did not believe that EV adoption would significantly impact pollution levels, suggesting some skepticism regarding the effectiveness of EVs in addressing environmental concerns.

Overall, these findings highlight broad optimism about the ecological benefits of EVs in Pune, while also underscoring the need for targeted awareness campaigns, education initiatives, and evidence-based policy measures to strengthen public confidence and address doubts about pollution reduction

8.9 Comparative Analysis: EV vs. Non-EV vs. Hybrid Owners

Table 1 : EV vs. Non-EV vs. Hybrid Owners

Aspect	EV Owners(17.3)	Non EV Owners(39.1)	Hybrid Owners (Both EV + Non EV, 33.1%)	Insights / Implications
Age Distribution	Predominantly 25–35	Predominantly <25	Mixed, mostly 25–45	Younger/mid-age groups are early adopters; hybrids indicate transitional behavior.
Gender	Male-dominant (~70%)	Male-dominant (~70%)	Slightly higher male share	Gender imbalance persists across all groups; male consumers currently drive adoption.
Education	Mostly postgraduate/professional	Similar trend, slightly lower postgraduate	Higher concentration of postgraduate & professional	Higher education correlates with EV awareness and hybrid adoption.
Occupation	IT/Software & Business	Students dominate	Mixed: Business, Government, Students	Hybrid owners show flexibility; EV owners often tech savvy or entrepreneurial.
Household Income	₹60,001–1,00,000 & above	₹30,000–60,000 & below	₹60,001–1,00,000	EVs require slightly higher disposable income; hybrids bridge affordability gap.
Vehicle Type Owned	Mainly 2-wheelers (EV scooters)	Mostly 2 wheelers & ICE cars	Combination of 2 wheelers + 4	Hybrids demonstrate multi-vehicle

			wheelers	strategy,reflecting gradual transition.
Recency of Purchase	1–3 years mostly	3–5 years mostly	Varied, higher proportion of recent purchases	EV and hybrid owners are early adopters
Primary Purchase Purpose	Daily commute & personal use	Family/personal & leisure	Mixed: commute + family/business	EV suitability aligns with urban daily travel distances
Purchase Decision Drivers	Fuel/energy efficiency (highest), environmental concern	Price/cost, performance & features	Combination: efficiency + cost + performance	EV buyers prioritize sustainability; non EV buyers prioritize affordability.
EV Awareness	High (Level 4–5)	Low to moderate	High	Awareness strongly influences hybrid adoption
Government Incentive Awareness	75% aware	65% aware	70% aware	Knowledge of subsidies is correlated with EV
Perceived Environmental Benefit	Strong agreement	Moderate agreement	Mixed	EV owners see environmental benefits clearly; non EV owners skeptical
Willingness to Pay Higher Upfront Cost	>60% willing	~30% willing	~50% willing	Cost is less of a barrier for early EV adopters; hybrid buyers compromise.
Primary Concerns	Charging infrastructure (most), range, long charging time	Cost & performance	Infrastructure + cost	Infrastructure & range are key barriers; non-EV buyers emphasize cost.
Information Sources	Online reviews & social media	Friends/family & dealership	Online research + family	Digital literacy influences EV/hybrid decisions; traditional sources matter

				more for non-EVs.
Future Purchase Intentions	65% definitely consider future EV purchase	30% maybe, 15% unlikely	55% definitely, 35% maybe	Hybrid owners likely to fully transition to EV over time.
Belief in Pollution Reduction	70% yes	40% yes	55% yes	Positive environmental perception

8.10 Hypothesis Testing and Validation

Environmental Awareness Drives EV Adoption
The first hypothesis (H1) examined whether environmentally conscious residents in Pune are more likely to adopt electric vehicles (EVs). The survey strongly supports this. About 34% of respondents strongly agreed that EVs are eco-friendly, and 53% believe EV adoption will meaningfully reduce pollution. Additionally, 54% said they would definitely consider purchasing an EV, showing that environmental awareness strongly motivates adoption, even when cost or infrastructure concerns exist.

Infrastructure and Cost as Adoption Barriers
The second hypothesis (H2) suggested that charging infrastructure inadequacy and high initial costs are the main obstacles preventing non-EV owners from switching. The findings partially confirm this. The top concern was charging infrastructure (40.6%), followed by long charging times and limited driving range (36.8% each). High upfront costs were less significant (26.3%). Among non-EV owners, infrastructure was cited as the primary barrier (35.3%), while lack of awareness (24%) and performance concerns (17%) were secondary. This shows that while cost matters, infrastructure remains the key challenge.

Awareness of Incentives Enhances Purchase Intentions
The third hypothesis (H3) proposed that knowledge of government subsidies, incentives, and EV technology increases purchase intentions. This is strongly supported: 69% of respondents were aware of such programs, and those with higher awareness were more likely to express definite intentions to buy (54%), whereas less-informed individuals were more hesitant. This underscores the importance of awareness campaigns to drive adoption.

Summary: Environmental awareness, infrastructure readiness, and knowledge of incentives are critical factors for EV adoption in Pune. Infrastructure is the most significant barrier, while awareness serves as a major enabler**.**

8.11 Key Findings

1.   **Demographics**: The majority of respondents are young and middle-aged (57% under 35), highly educated (66% postgraduates/professionals), and male-dominated (71%). Students, entrepreneurs, and government employees are the largest groups. Household incomes mostly fall below ₹1,00,000/month.

2.   **Vehicle Ownership**: Non-EVs are still most common. 17% own EVs, and 33% own both EVs and non-EVs, indicating a transition phase. Two-wheelers dominate (48%), suitable for urban commuting. Most purchases occurred within the last five years (82%). Vehicles are mainly used for personal/family purposes (49%) and daily commuting (32%).

3.   **Purchase Drivers:** Fuel efficiency (47%), performance/features (41%), and price (35%) are top decision factors. Peer influence and government incentives have smaller impacts. Online reviews, social media, and family opinions are influential.

4.   **EV Awareness:** Awareness is polarized: 30% highly knowledgeable, 26% largely uninformed. 69% know about government incentives, but information gaps remain.

5.   **Environmental & Economic Perceptions**: Most recognize environmental benefits. 58% perceive long-term economic advantages, and 50% are willing to pay higher upfront costs.

6.   **Primary Barriers:** Top concerns are limited charging infrastructure (41%), long charging times (37%), and restricted driving range (37%). Cost, performance, and awareness are secondary.

7.   **Future Intentions:** 54% are committed to buying EVs, and 36% are potentially open. Improvements in infrastructure, faster charging, and longer range motivate adoption.

8.   **EV Adoption Outlook:** Respondents are optimistic: 57% expect significant adoption in the next five years, and 53% believe EVs will reduce pollution.

Overall Insight: EV adoption in Pune is driven by environmental awareness, infrastructure readiness, and economic considerations. Knowledge and incentives encourage adoption, but infrastructure remains the main barrier.

9.   **Framework and Recommendations**

To accelerate EV adoption, a holistic framework is needed:

•   **Infrastructure Expansion:** Public charging networks across residential areas, workplaces, malls, and highways; support for private charging. Provide clear range and performance info to reduce range anxiety.

•   **Awareness & Education:** Targeted campaigns highlighting environmental benefits, cost savings, and government incentives. Use digital platforms, social media, online reviews, test drives, and workshops.

•   **Economic Incentives:** Promote subsidies, tax rebates, low-interest loans, flexible financing, battery leasing, and trade-in schemes. Encourage businesses to adopt EV fleets.

•   **Stakeholder Collaboration:** Government, manufacturers, infrastructure providers, and urban planners should coordinate to deploy infrastructure and policies effectively.

•   **Monitoring & Feedback:** Use surveys and real-world data to track adoption trends and improve strategies continuously.

This integrated approach combines infrastructure, awareness, incentives, and stakeholder engagement, providing a roadmap for sustainable EV adoption in Pune.

10.   **Further Research Directions**

Future studies could explore:
•   Longitudinal tracking of adoption trends and attitudes.

•   Behavioral and psychological drivers, including social influence and risk perception.

•   Comparative analysis across cities/regions for infrastructure and policy effectiveness.

•   Commercial and fleet adoption strategies.

•   Effectiveness of policy interventions like subsidies and incentives.

- Consumer responses to emerging EV technologies (ultra-fast charging, battery swapping, connected vehicles).

11. Conclusion

The study highlights that EV adoption in Pune is influenced by environmental awareness, infrastructure, and economic factors. Young, educated, and tech-savvy residents are early adopters, preferring two-wheelers for urban commuting. Infrastructure inadequacy, long charging times, and limited range are primary barriers. Government incentives, awareness campaigns, and cost benefits are key enablers. Digital and personal networks, including social media, online reviews, and family, shape purchase decisions.

A holistic approach combining infrastructure, awareness, policy, and stakeholder collaboration is essential for promoting EV adoption, sustainable urban mobility, and pollution reduction in Pune.

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