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Consumer Perception and Adoption Intention Towards Electric Vehicles: Evidence from Karnataka

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Abstract

Electric vehicles (EVs) are central to India's plans for cleaner transport, yet ownership remains far below the interest consumers express, especially in smaller cities. This paper reports a survey of 175 consumers, most of them living in Mysuru and neighbouring districts of Karnataka, the state that issued India's first dedicated EV policy in 2017. An online questionnaire informed by the Theory of Planned Behavior captured respondents' profile, vehicle ownership, attitude, perceived attractions and obstacles, the importance attached to nine purchase attributes, preferred incentives, and expected future purchase. Only 5.7% of respondents own an EV, but 72.5% answered "Yes" or "Maybe" when asked whether they are considering one, and half (50.3%) hold a positive or very positive attitude. Respondents rated brand and model availability (M = 4.45), driving range (M = 4.41) and maintenance cost (M = 4.40) as the most important attributes, and named battery life and replacement cost (60.0%), limited range (57.7%) and inadequate charging infrastructure (56.0%) as the main obstacles. Chi-square tests showed that purchase consideration did not differ by gender, age, income or education (all $p > .05$), whereas it was clearly linked to attitude ($\chi^2 = 46.97$, $p < .001$) and to self-rated awareness ($\chi^2 = 17.83$, $p = .023$). In this group, what people believe and know about EVs matters more than who they are. The paper draws out implications for awareness programmes, charging provision, and the way manufacturers and dealers communicate range and battery performance.

Keywords: electric vehicles; adoption intention; consumer attitude; awareness; Theory of Planned Behavior; Tier-2 cities; Karnataka

1. Introduction

Road transport worldwide is moving away from the internal combustion engine. Climate targets, unstable oil prices and public subsidy programmes have together pushed electric drive from a niche option toward the mainstream (International Energy Agency [IEA], 2024). India has chosen to take an active part in this change. NITI Aayog (2025) values the domestic EV opportunity at about US$200 billion by the early 2030s, and registration figures already show the trend: annual EV registrations climbed from 1.68 million in FY 2023–24 to close to two million in FY 2024–25, growth of roughly 17–22% in a single year (Society of Indian Automobile Manufacturers [SIAM], 2024; Statista, 2025). Central schemes have paid for much of this expansion. The best known, the second phase of Faster Adoption and Manufacturing of Electric Vehicles (FAME-II), had its outlay raised to ₹11,500 crore for purchase subsidies, charging points and electric buses (Ministry of Heavy Industries [MHI], 2022).

Karnataka has a particular place in this picture. Its Electric Vehicle and Energy Storage Policy of 2017 was the first such state policy in India and came before the central FAME-II scheme; the state has since developed one of the larger public charging networks in the country (Fathima Zehra, 2025; Government of Karnataka,

2021). Most consumer research on the state, however, comes from Bengaluru (Ghosh & Sarkar, 2026), so the state's EV consumer is understood mainly through a metropolitan lens. Adoption outside the capital has followed a different path. Since 2023, electric two-wheeler uptake beyond the largest cities has slowed because of safety worries and weak buyer confidence, even while electric cars and buses continue to grow (Fathima Zehra, 2025). Because smaller cities and semi-urban areas account for a large part of the two-wheeler market, consumer views in these places need to be studied directly instead of being inferred from Bengaluru.

The present paper takes up that task. It surveys 175 consumers, most of whom live in Mysuru or the adjoining districts of Mandya, Hassan, Kodagu and Chamarajanagar, with a smaller group from Bengaluru. The analysis is framed by the Theory of Planned Behavior (Ajzen, 1991) and draws on related adoption models (Davis, 1989; Rogers, 2003; Venkatesh et al., 2003). Four questions guide it. How widespread are EV ownership and awareness among these consumers? What attitudes, obstacles and purchase priorities do they report? Is intention to buy related to demographic characteristics, to perceptual factors, or to both? And what follows for manufacturers, dealers and policymakers? An earlier paper based on the same survey applied machine-learning classifiers to predict adoption intention for charging-infrastructure planning (Shivabeerappa et al., 2026); the present study instead reports the full descriptive profile and the tests of association, which that paper did not cover.

The study therefore has four objectives: (1) to describe the respondents' demographic profile, the vehicles they own and how aware they are of EVs; (2) to measure their general attitude toward EVs and the reasons and concerns they associate with adoption; (3) to establish which purchase attributes, such as price, range, incentives and brand choice, they consider most important; and (4) to test whether intention to buy differs across demographic groups (gender, age, income, education) or across levels of attitude and awareness. Section 2 reviews prior work, Section 3 describes the method, Section 4 presents and discusses the results, and Section 5 concludes with the study's limitations and directions for further research.

2. Literature Review

2.1 Theoretical Lenses on Technology and Green Product Adoption

A handful of theories recur in EV adoption research. In the Theory of Planned Behavior (TPB), a person's intention to act depends on how they evaluate the act, the social pressure they perceive, and how much control they believe they have over carrying it out (Ajzen, 1991). TPB is the framework most often used in EV studies, both in India and abroad (Gayathiri & Ahamed, 2025; Shalender & Sharma, 2021; Wang et al., 2016; Yeğin & Ikram, 2022). The Technology Acceptance Model looks instead at whether users expect a technology to be useful and easy to use (Davis, 1989). The Unified Theory of Acceptance and Use of Technology (UTAUT) brings several of these models together and reduces them to four predictors: expected performance, expected effort, social influence and supporting conditions (Venkatesh et al., 2003). Diffusion of Innovations theory (Rogers, 2003) adds a market-level view, explaining how quickly a new product spreads from enthusiasts to ordinary buyers by reference to its advantage over existing options, its fit with users' habits, its complexity and how visible its benefits are. Because buying a vehicle involves cost, infrastructure and self-image at the same time, a number of EV studies combine frameworks, most commonly TPB and UTAUT (Abbasi et al., 2021).

2.2 Influences on EV Purchase Intention: International Evidence

Studies outside India point to a fairly stable list of influences. Concern for the environment and perceived value improve attitude, and attitude in turn raises intention to buy (Dutta & Hwang, 2021). Uncertainty about an unfamiliar battery technology lowers intention unless it is countered by communication that builds trust (Featherman et al., 2021). Financial incentives have a measurable effect on EV uptake across countries (Sierzchula et al., 2014). Feelings also count for more than early rational-choice accounts allowed: consumption values and emotional reactions shape battery-EV purchase decisions alongside functional attributes (McCarthy et al., 2025), and the weight of emotion differs between income groups (He et al., 2023). Young, environmentally minded consumers seem to form a separate early-adopter group, as shown by work on EV rental among young city dwellers (Gulzari et al., 2022) and on first-time battery-EV buyers in Ireland (Mukherjee & Ryan, 2020) and Malaysia (Asadi et al., 2021).

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2.3 EV Adoption Research in the Indian Context

Indian studies largely echo these results while adding local detail. Khurana et al. (2020) showed that attitude carries the effect of consumers' beliefs through to intention. In a national exploratory survey, Chhikara et al. (2021) found charging provision, price and range to be the three main obstacles. Using an extended TPB, Shalender and Sharma (2021) reported that perceived behavioral control, that is, buyers' confidence that they could operate and look after an EV, predicted intention more strongly than any other factor of intention. Two studies by Jaiswal and co-authors stand out for their design: the first relates values about sustainable transport to adoption intention (Jaiswal et al., 2021), and the second divides the Indian market into buyer segments that respond differently to price, range and environmental appeals (Jaiswal et al., 2022). Krishnan and Koshy (2021) focused on households that already own a petrol or diesel vehicle, probably the most realistic pool of near-term buyers, and found that expected savings on running costs mattered more to them than environmental motives. Among university students in Bengaluru, Ghosh and Sarkar (2026) found that perceived economic benefits and demand-side incentives raised adoption intention, whereas publicity and information measures had no significant effect. Deka et al. (2023) showed that messages stressing what buyers would gain persuaded Indian respondents more than messages stressing what they would lose. Pooling many such studies, Singh et al. (2020) concluded that cost and infrastructure usually outweigh emotional and identity factors.

2.4 Barriers, Enablers and the Role of Awareness

Four obstacles appear again and again in this literature: short driving range, slow charging, high purchase price and too few charging points (Balasubramanian et al., 2024; Chhikara et al., 2021; Kumar & Alok, 2020; Pradeep et al., 2021). Consumer awareness, which arguably comes before all of these, has received less attention. In a study of renewable-energy adoption, Kot (2021) found awareness and self-efficacy to be linked with adoption intention independently of environmental concern. The same logic applies to EVs: people cannot hold a well-founded attitude toward a technology they know little about. In a related vein, Chen (2025) showed that a firm's ESG communication builds trust in the brand, and that this trust carries through to intention to buy sustainable products. The way manufacturers and dealers talk about EVs, and not only the incentives on offer, may therefore affect whether interest becomes a purchase.

2.5 Karnataka's Policy Landscape and the Research Gap

Research on Karnataka has so far concentrated on infrastructure and aggregate adoption figures rather than on individual buyers. Fathima Zehra (2025) follows the state's EV sector from the 2017 policy to 2025 and reports strong growth in electric cars and buses but a fall-off in two-wheeler sales after 2023, linked to safety concerns and low buyer confidence, both of which are consumer-side factors measured in this study. At the national level, Nigam et al. (2025) used state-wise data to show that the number of charging stations and local pollution levels are associated with EV adoption across Indian states, while NITI Aayog (2025) sets out the economic case for continued expansion. Primary survey data from buyers in Karnataka's smaller cities such as Mysuru, Mandya and Hassan, as opposed to Bengaluru, remain scarce. This study is a contribution toward filling that gap.

3. Research Methodology

3.1 Research Design

A descriptive cross-sectional survey was used. Such a design records respondents' views at one point in time; it is suited to describing current perceptions, though it cannot trace how they change (Saunders et al., 2019).

3.2 Sample and Data Collection

The questionnaire was built in Google Forms and shared online. After incomplete returns were removed, 175 responses remained for analysis. Participants were reached through convenience and snowball sampling, because time and resources did not permit a probability sample; Section 5.1 returns to this point. Most respondents live in Mysuru district (76.6%); the rest come from Bengaluru (7.4%), Kodagu, Mandya, Hassan and Chamarajanagar, together with a few who listed several districts or "other". The same dataset was used in a separate machine-learning analysis (Shivabeerappa et al., 2026); the descriptive and association results reported here have not been published elsewhere.

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3.3 Instrument

The instrument had six parts. Part A recorded age, gender, education, occupation, income and city of residence. Part B asked which vehicles the respondent owns and, for EV owners, how long they have owned one. Part C asked for an overall attitude toward EVs and, through multiple-choice items, the features that attract respondents to EVs and the worries that make them hesitate. Part D contained eight agreement statements on a five-point scale (1 = strongly disagree, 5 = strongly agree) dealing with environmental responsibility, affordability, reliability compared with conventional vehicles, adequacy of charging points, the expected direction of the market, the appeal of government incentives, the social standing that ownership brings, and readiness to pay more for an EV. Part E asked respondents to rate, from 1 (not at all important) to 5 (very important), nine purchase attributes: price, charging infrastructure, driving range, battery life and warranty, maintenance cost, environmental benefit, government incentives, brand and model availability, and resale value. It also asked which incentives they would prefer and, for current owners only, eight satisfaction questions. Part F covered the likelihood of buying an EV in future, self-rated awareness, and an open comment.

3.4 Data Analysis

Analysis was carried out in Python with the pandas and SciPy libraries. Frequencies, percentages, means and standard deviations describe the sample and the rating items. Pearson's chi-square test of independence was used to examine whether purchase consideration and future purchase likelihood vary with demographic and perceptual variables, and Cramér's V is reported to show the strength of each association. Answers to multiple-choice items (attractions, concerns, incentives) were split into separate options and counted. Results are treated as significant where $p < .05$.

4. Results and Discussion

4.1 Sample Profile

The respondent profile appears in Table 1. Most respondents are well educated and early in their careers: three in four (75.4%) hold at least a postgraduate degree, 68.6% work in the private sector, and 75.4% are between 26 and 45 years old. Household incomes are mostly modest, with 65.1% reporting less than ₹5 lakh a year. Two-wheelers are the main mode of transport: 50.3% own a two-wheeler only and another 38.3% own both a two-wheeler and a car, in line with the general make-up of India's vehicle fleet.

Table 1. Demographic profile of respondents

Variable	Category	n	%
Age	Below 25	33	18.9
	26–35 years	61	34.9
	36–45 years	71	40.6
	46–60 years	10	5.7
Gender	Male	80	45.7
	Female	95	54.3
Education	12th / PUC	2	1.1
	Degree	24	13.7
	Post Graduation	132	75.4
	Ph.D. and above	17	9.7
Occupation	Private Employee	120	68.6
	Not Employed	26	14.9
	Service Sector	11	6.3
	Business	9	5.1
	Govt. Employee	9	5.1
Annual Income	Below ₹3 lakh	49	28.0
	₹3–5 lakh	65	37.1

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Variable	Category	n	%
	₹5–8 lakh	16	9.1
	₹8–12 lakh	23	13.1
	Above ₹12 lakh	22	12.6
City	Mysuru	134	76.6
	Bengaluru	13	7.4
	Kodagu	8	4.6
	Mandya	6	3.4
	Hassan	5	2.9
	Other / multi-district	9	5.1

Note. N = 175. Percentages within each variable may not total exactly 100 due to rounding. Source: Primary data

4.2 EV Ownership, Awareness and Purchase Consideration

Table 2 summarises ownership, awareness and purchase consideration. Ten respondents (5.7%) currently own an EV, and 81.7% of the sample marked the ownership-duration question "not applicable", so EV ownership is still uncommon in this group despite rising national registrations (SIAM, 2024). Awareness is also limited. Most respondents (65.5%) describe their knowledge of EVs as "moderate", 26.2% as "low" or "very low", and just 8.3% as "high" or "very high". Interest in buying is nonetheless considerable: 35.1% answered "Yes" and 37.4% "Maybe" when asked whether they are considering an EV, giving 72.5% who are at least open to the idea, against 27.5% who said "No". Looking further ahead, 57.1% expect that they "definitely" or "probably" will purchase an EV.

Table 2. EV ownership, awareness and purchase consideration

Indicator	Category	n	%
Currently own an EV	Yes	10	5.7
	No	165	94.3
Considering EV purchase	Yes	60	35.1
	Maybe	64	37.4
	No	47	27.5
Awareness level	Very High / High	14	8.3
	Moderate	110	65.5
	Low / Very Low	44	26.2
Future purchase likelihood	Definitely / Probably	100	57.1
	Not sure	49	28.0
	Probably not / Definitely not	26	14.8

Note. Percentages for "Considering EV purchase" are based on n = 171 valid responses. Source: Primary data

4.3 Attitude, Drivers and Barriers

Attitudes lean positive. Half the respondents (50.3%) call their attitude toward EVs "positive" or "very positive", 37.1% are "neutral", and 12.6% are "negative" or "very negative". The feature that most often attracts respondents is environmental impact (80.0%), followed by performance (44.0%), cost of ownership (40.6%) and the availability of charging stations (36.0%). The most frequent concerns are battery life and replacement cost (60.0%), short driving range (57.7%), insufficient charging infrastructure (56.0%), long charging time (46.3%) and high purchase price (45.1%). This list of concerns closely resembles the national findings of Chhikara et al. (2021) and Balasubramanian et al. (2024).

4.4 Purchase-Relevant Priorities

Table 3 gives the mean importance of each of the nine attributes. Brand and model availability scored highest (M = 4.45, SD = 1.07), only just above driving range (M = 4.41, SD = 0.99), maintenance cost (M = 4.40, SD = 1.08) and government incentives (M = 4.39, SD = 1.07). Purchase price still received a high score (M = 4.11)

but came eighth of the nine, ahead only of battery life and warranty. The preferred incentive was a tax credit or rebate (65.1%), followed by free or cheaper charging (53.1%) and reduced registration fees (47.4%). When asked what would make them more likely to buy, respondents chose longer range (69.7%), more charging points (69.1%), faster charging (67.4%) and better battery life (66.9%). These are essentially the same items they listed as concerns, which suggests that the answers are internally consistent.

Table 3. Mean importance ratings of purchase attributes

Attribute	M	SD
Brand / model availability	4.45	1.07
Driving range	4.41	0.99
Maintenance cost	4.40	1.08
Government incentives	4.39	1.07
Environmental benefit	4.26	0.99
Resale value	4.21	1.13
Charging infrastructure availability	4.12	1.10
Purchase price	4.11	1.17
Battery life / warranty	4.02	0.99

Note. Rated on a 5-point scale (1 = not important at all, 5 = very important). N = 175. Source: Primary data

The ten current owners were most satisfied with after-sales service (M = 4.80) and savings on running costs (M = 4.20), but much less willing to recommend their vehicle to others (M = 2.40). With so few owners this contrast should be read with caution, but it deserves follow-up in a study with a larger group of owners.

4.5 Tests of Association

Table 4 presents chi-square tests linking purchase consideration and future purchase likelihood to the candidate variables. Gender, income, age and education all failed to reach significance. Both perceptual variables were. Attitude was strongly related to purchase consideration ($\chi^2 = 46.97$, df = 8, $p < .001$, Cramér's V = .371). Awareness was related to purchase consideration ($\chi^2 = 17.83$, df = 8, p = .023, V = .233) and to future purchase likelihood ($\chi^2 = 35.56$, df = 16, p = .003, V = .230). The type of vehicle currently owned was also related to consideration ($\chi^2 = 38.35$, df = 10, $p < .001$), but this partly follows from how the categories were defined, because almost every respondent who already owns an EV, alone or with a conventional vehicle, answered "Yes".

Table 4. Chi-square tests of association with purchase consideration and future purchase likelihood

Variable Pair	χ^2	df	p	Cramér's V	Sig.
Gender × Attitude	2.24	4	.693	.113	ns
Gender × Considering purchase	0.31	2	.857	.042	ns
Income × Considering purchase	12.58	8	.127	.192	ns
Income × Future likelihood	14.59	16	.555	.144	ns
Age × Future likelihood	16.82	12	.156	.179	ns
Education × Considering purchase	9.64	6	.141	.168	ns
Awareness × Considering purchase	17.83	8	.023	.233	p < .05
Awareness × Future likelihood	35.56	16	.003	.230	p < .01
Attitude × Considering purchase	46.97	8	< .001	.371	p < .001
Current vehicle type × Considering purchase	38.35	10	< .001	.335	p < .001

Note. ns = not significant at the .05 level. N varies slightly (164–175) across tests due to missing responses. Source: Primary data

4.6 Discussion

The overall pattern is straightforward. In this sample, openness to buying an EV depends little on demographic position and a good deal on beliefs and on how well informed people feel. The strong link between attitude and purchase consideration (V = .371) fits the Theory of Planned Behavior (Ajzen, 1991) and the Indian studies that have applied it (Gayathiri & Ahamed, 2025; Khurana et al., 2020; Shalender & Sharma, 2021), which

repeatedly find attitude to be the nearest, and often the strongest, antecedent of intention. The awareness result agrees with Kot (2021), who found awareness to matter for renewable-energy adoption independently of environmental concern. It contrasts, however, with Ghosh and Sarkar (2026), whose Bengaluru students did not respond to publicity and information measures; one possible reading is that information matters more where baseline awareness is lower, as in the Tier-2 setting studied here. The practical consequences are taken up in Section 4.7.

The lack of demographic differences is perhaps the more notable result, because international work finds that consumers' responses to EVs differ by income (He et al., 2023). Part of the explanation may lie in the sample itself. Respondents are similar in education (75.4% postgraduate or above) and age (75.4% aged 26–45), which leaves little variation for the chi-square tests to register. A second possibility is that Karnataka's early and visible policy activity (Government of Karnataka, 2021) has spread awareness of, and openness to, EVs across income groups more quickly than in places without such a profile, weakening the income gradient seen elsewhere. Both explanations are compatible with Fathima Zehra's (2025) account of the post-2023 two-wheeler slowdown in Karnataka, which is attributed to worries about safety and confidence that cut across income levels. The obstacles reported in this survey point the same way: range, battery cost and charging provision, rather than price alone, dominate.

Price deserves a further comment. Its mean importance (M = 4.11) is high in absolute terms, yet it ranks second-lowest of the nine attributes. Price is clearly not unimportant; a score above 4 on a five-point scale signals real concern. The ranking suggests, though, that brand and model choice, range and running costs do more than the sticker price to separate likely buyers from the rest. This agrees with Krishnan and Koshy (2021), whose households already owning conventional vehicles judged EVs on total cost of ownership and valued running-cost savings above purchase price.

Finally, the strong preference for tax credits and rebates (65.1%) is consistent with cross-country evidence that financial incentives raise EV uptake (Sierzchula et al., 2014) and with the UTAUT-based finding of Abbasi et al. (2021) that supporting conditions, including fiscal incentives, shape willingness to adopt. Read together with the awareness effect, this indicates that incentives and information working together are more likely to move the 37.4% who answered "Maybe" toward a purchase than either measure on its own.

4.7 Implications

For policymakers, the main message is that raising awareness is not a minor supplement to subsidies and charging investment; in this sample it carries real statistical weight. State and district EV cells could run organised awareness drives, including demonstrations at dealerships, test-drive schemes designed to ease range anxiety, and simple total-cost-of-ownership calculators, with particular attention to smaller cities like Mysuru, in which 91.7% of respondents rate their awareness as moderate or lower. More charging points outside Bengaluru are still needed, but the evidence here suggests they will not be enough by themselves: infrastructure removes a stated obstacle, while attitude and awareness decide whether that change leads to a purchase.

Manufacturers and dealers should focus on two things. The first is a wider range of brands and models, since this was the attribute respondents valued most. The second is credible information about range and battery life, which appeared both among the leading concerns and among the improvements most likely to prompt a purchase. Among the few current owners, high satisfaction with service and running costs (M = 4.20–4.80) sat alongside a low readiness to recommend (M = 2.40). Although based on very few cases, this hints that a good after-sales experience is not yet turning owners into advocates, a point worth testing with a larger owner sample.

Digital tools offer one practical way to act on these findings. Dealer customer-relationship systems can match information on incentives, range and nearby charging to each prospect's actual travel pattern, delivering the combination of awareness and incentive information that this study found to matter. Predictive models built on survey data of this kind (Shivabeerappa et al., 2026) could help direct such communication toward the undecided segment.

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5. Conclusion

This paper asked what shapes EV adoption intention among consumers in the Mysuru region at a time when policy support and charging investment are growing faster than actual purchases. For this group, the distance between policy ambition and ownership is mainly a matter of perception, not demography. Attitude and awareness distinguish those open to buying an EV from those who are not; gender, age, income and education do not. The obstacles respondents name, namely range, battery cost and charging provision, match those in the wider literature. Alongside them, however, stands a large undecided group, the 37.4% who answered "Maybe", for whom better information, clearly explained incentives and a wider choice of models could make the difference. For industry and government alike, narrowing this perception gap may be a faster route to higher adoption than infrastructure investment alone.

5.1 Limitations and Future Research

The findings are subject to several limitations. Respondents were recruited by convenience and snowball methods, not by random selection, and most live in Mysuru district, so the results should not be generalised to Karnataka or to India without caution. Because the design is cross-sectional, it records what people say they intend to do, not what they later buy; given the gap between stated attitudes and actual behaviour that is common for green products, stated openness may overstate future adoption. With only ten EV owners, the satisfaction results are indicative at best. Associations were examined with bivariate tests and do not establish cause. Further studies could use stratified random samples across several districts, follow respondents over time to compare intention with actual purchase, and test a complete TPB or UTAUT model with structural equation modelling.

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Declaration of AI Use

The authors used an AI language tool to edit and rephrase portions of the manuscript text. The study design, data collection, analysis and conclusions are the authors' own. The authors reviewed all edited text and take full responsibility for the content of this article.

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