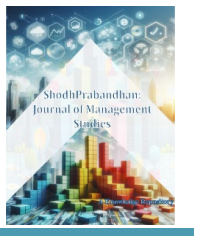
ShodhPrabandhan: Journal of Management Studies
July-September 2026 3(2)
https://shodhprabandhan.com



Original Article

DETERMINANTS OF ELECTRIC VEHICLE ADOPTION: A PRISMA-BASED SYSTEMATIC REVIEW OF CONSUMER PERCEPTIONS AND BEHAVIOURAL INTENTIONS IN THE INDIAN CONTEXT

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ABSTRACT

Purpose: Despite the bold EV penetration targets set in India and in the state of Punjab, and significant fiscal and infrastructural incentives provided for the adoption of EVs, the actual uptake of EVs does not match the policies. This study aims to integrate the existing, disparate findings from the empirical literature on the determinants affecting consumer perceptions, attitudes, behavioural intentions and actual EV adoption, and identify a research agenda, particularly in the Indian and Punjab context.

Design/Methodology/Approach: 1,229 records were retrieved after performing a structured search in Scopus, Web of Science, ScienceDirect and Google Scholar (2009–2025) and supplemented by using reference chaining, following the PRISMA 2020 protocol. Following the removal of duplicates, title/abstract screening and assessment of full text for eligibility, 20 studies were selected for thematic synthesis of their qualitative results. The study context, design, determinant–outcome associations reported in the study, and sample were identified and extracted, and evidence was synthesized with the five behavioural theories (TPB, TAM, DOI, VBN and the S–O–R framework).

Findings: Charging infrastructure, perceived/upfront cost and environmental concern were the most commonly reported determinants while social influence, technological convenience, and range anxiety were reported next. Government incentives and policy were a recurring moderator of the intention–adoption relationship and were not a direct cause. The synthesis verifies a long-standing finding of intention–action gaps (positive attitudes and intentions do not always lead to actual purchase), and most evidence from India is based on convenience, small, urban samples, that lack the heterogeneity found across regions and demographics.

Originality/Value: The review combines determinant-level evidence in an attitude–intention–adoption relationship moderated by policy and provides a unified conceptualization and prioritized policy research agenda for EV markets in emerging economies based on theory, longitudinal, and regionally representative approaches.

Keywords: Electric Vehicle Adoption, Consumer Perception, Behavioural Intention, Charging Infrastructure, Policy Incentives, Systematic Review, Prisma, India, Punjab

INTRODUCTION

The transition in the global transport sector from internal combustion to electrified modes of transport is being driven by the need to mitigate climate change and to reach a point of exhaustion for the non-renewable fossil fuel component of transportation

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Received: 06 May 2026; **Accepted:** 23 June 2026; **Published** 08 July 2026
DOI: 10.29121/ShodhPrabandhan.v3.i2.2026.106
Page Number: 15-26
Journal Title: ShodhPrabandhan: Journal of Management Studies
Journal Abbreviation: ShodhPrabandhan J. Manag. Stud.
Online ISSN: 3049-2416, **Print ISSN:** 3108-1975
Publisher: Granthaalayah Publications and Printers, India
Conflict of Interests: The authors declare that they have no competing interests.
Funding: This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.
Authors' Contributions: Each author made an equal contribution to the conception and design of the study. All authors have reviewed and approved the final version of the manuscript for publication.
Transparency: The authors affirm that this manuscript presents an honest, accurate, and transparent account of the study. All essential aspects have been included, and any deviations from the original study plan have been clearly explained. The writing process strictly adhered to established ethical standards.

International Energy Agency (2024). Electric vehicles (EVs) have become a significant policy tool and are on the verge of becoming ubiquitous, with over half of China's new cars electric and the electric car market share in Europe rising to 25% and over 11% of the United States' new cars by the end of 2024 (IEA, 2024, Jung et al. (2023). The importance of these trends is that they indicate that policy signaling, improving battery technology and building a dense charging network all work together to drive the shift away from traditional vehicles.

India has joined this bandwagon. The country's ambitious goal of achieving 30% electric vehicles (EVs) of new vehicle sales by 2030 is enshrined in the Faster Adoption and Manufacturing of Electric Vehicles (FAME) II scheme and the overall electric-mobility roadmap, which also includes incentive measures, manufacturing localisation and expansion of charging networks NITI Aayog and Rocky Mountain Institute (2019), NITI Aayog (2024), Council on Energy, Environment and Water (2023). The country saw an increase in the number of EV registrations from about 50,000 in 2016 to some millions in the mid-2020s, indicating that the EV market has gained significant traction NITI Aayog (2024). However, the penetration is relatively low with respect to the total estate and the adoption is geographically skewed.

Punjab is a case in point of opportunity and challenge. With the surge in urbanisation and ever increasing vehicle usage, environment and public health challenges have become a growing problem in the metros like Ludhiana, Amritsar, Jalandhar, Patiala, Bathinda & Hoshiarpur etc Government of Punjab (2022). The Punjab State Electric Vehicle Policy 2022 aims to achieve a significant percentage of electric vehicle sales in the next 10 years, providing purchase grants and road-tax exemptions as well as investments in public charging stations YoCharge (2023), EV India (2025), Mercom India (2022). Despite this, a regional picture has emerged in recent years that consumers are still grappling with the issues of cost, unfamiliarity with technology, and concerns about convenience and reliability, with pockets of pro-EV sentiment and widespread reluctance Kaur Channi (2025), Singh and Arneja (2022), Hasan (2022), Mishra et al. (2024).

Therefore, the problem that has motivated this review is the intention–action gap, which refers to the gap between intentions and actions, as in the latter, there is a low conversion rate as people do not buy the product as expected by planners even though the economic and environmental benefits are there Bindhya et al. (2025), Chandel (2023). The empirical literature that has explored why consumers don't EV-ify in India has been fast increasing, but is fragmented by a variety of constructs, samples and theoretical perspectives, complicating the task of synthesizing the findings of this research or determining which factors are the most important for policy and practice.The empirical literature on why consumers do or do not EV-ify in India has also increased rapidly, but is not uniform across constructs, samples and theoretical lenses, making it tricky to draw cumulative conclusions or to determine which factors are most important for policy and practice Das and Sharma (2025). It is therefore appropriate to have a systematic and protocol based synthesis.

In this context, the present review aims at four goals: (i) to highlight and summarize the determinants of EV attitudes from the consumer's perspective; (ii) to investigate the relationship between consumer attitudes and behavioral intention; (iii) to explore the relationship between behavioural intention and actual EV adoption; and (iv) to analyze the role of government incentives and policy support in this process. There are 3 review questions at the end. RQ1: What are the most consistent consumer determinants in the Indian context that are correlated with attitude and intention toward EVs? RQ2: What is the strength of the attitude–intention–adoption pathway and how does it fail? RQ3: What is the status of policy incentives as a moderator and in what ways do they lack in evidence-based research and what are the gaps that need to be explored in future?

The review has three contributions. First, it does not rely on studies that focus on a single theory or single determinant, but rather it provides a view of the different determinants as a part of a single attitude–intention–adoption framework, highlighting the points at which the causal chain between the constructs is strong and weak. Second, its contextualization through privileging of India- and Punjab-relevant evidence, and retaining international benchmarks, allows for a contextually grounded synthesis, which can be readily used by state-level policymakers and manufacturers aiming to achieve the targets outlined under FAME II and the Punjab State EV Policy Jain (2022), NITI Aayog (2024), Government of Punjab (2022). Thirdly, it translates the diffuse findings into a prioritized and theory-informed research agenda for new economy EV markets. The theoretical background is developed in section 2, the PRISMA methodology is outlined in section 3, the characteristics of the included studies and the thematic synthesis is described in section 4, findings, gaps and implications are discussed in section 5, the limitations are presented in section 6, and the conclusion is presented in section 7.

THEORETICAL BACKGROUND

This synthesis relies on five complementary theories which are present in EV-adoption literature. They both draw the sketch of the trajectory from external stimuli and attributes of innovations to internal cognitive and normative states to the behavioural intentions and actual adoption.

THEORY OF PLANNED BEHAVIOUR (TPB)

According to the Theory of Planned Behaviour, attitude towards the behaviour, subjective norms and perceived behavioural control Ajzen (1991) are the determinants for intention to perform a behavior. In the EV setting, attitudes are related to perceived environmental benefits, perceived cost benefits, subjective norms are related to social expectations (family, peers, pro-environmental) and perceived behavioural control is related to access to technology, charging infrastructure and financial viability Ajzen (1991), Haustein (2018). TPB supplies the core attitude → intention → behaviour spine around which this review is organised.

TECHNOLOGY ACCEPTANCE MODEL (TAM)

TAM is a model that explains the uptake of technology in terms of perceived usefulness and perceived ease of use Davis (1989). Perceived usefulness is mapped onto the beliefs of performance, of running-cost savings and of utility, and both of these contribute to favourable attitudes and stronger intentions to adopt, as is the case for perceived ease of use and the technological convenience of EVs. The perceived-usefulness and technological-convenience determinants that are discussed below are particularly relevant to TAM.

DIFFUSION OF INNOVATION THEORY (DOI)

Rogers (2003) Diffusion of Innovation theory indicates that the diffusion of an innovation occurs with five attributes: relative advantage, compatibility, complexity, trialability and observability. In the case of EVs, relative advantage translates to environmental and economic benefit, compatibility and complexity translate to technological convenience, and trialability and observability translate to visibility and accessibility of EVs Rogers (2003).

VALUE–BELIEF–NORM (VBN) THEORY

According to VBN theory, personal values and environmental beliefs are associated with an internalized moral duty (personal norm) to act pro-environmentally Stern et al. (1999). It provides some explanation of why environmental concern can translate into willingness to adopt EVs: a norm of cleaner mobility is more likely to be internalised when there is strong biospheric values and acceptance of the consequences of environmental degradation.

STIMULUS–ORGANISM–RESPONSE (S–O–R) FRAMEWORK

The S–O–R framework suggests that behaviour is part of a sequence with external stimulus inputs influencing the internal states of the organism, which in turn lead to the output of behaviour. Mehrabian and Russell (1974) In the case of EVs, stimuli like costs, infrastructure and policies influence internal states of attitude and intention, which subsequently lead to adoption. S–O–R provides the most comprehensive perspective on how to bring the heterogeneous determinants together with the policy moderator into a single causal architecture.

Table 1

Table 1 Theoretical Frameworks and Their Linkage to Review Constructs

Theory	Relevant constructs	Application in this review
Theory of Planned Behaviour	Attitude → intention → behaviour; subjective norms; perceived behavioural control	Core pathway linking determinants to adoption; social influence
Technology Acceptance Model	Perceived usefulness; perceived ease of use	Perceived usefulness and technological convenience determinants
Diffusion of Innovation	Relative advantage; compatibility; complexity; trialability; observability	Rate and visibility of EV diffusion; infrastructure as trialability
Value–Belief–Norm	Values; environmental beliefs; personal norms	Environmental concern as a motivational determinant
Stimulus–Organism–Response	Stimuli (cost, infrastructure, policy) → organism (attitude, intention) → response	Holistic integration of determinants and policy moderator

METHODS

The review was developed and reported based on the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 statement Page et al. (2021), and conventions for systematic Tranfield et al. (2003) and evidence-informed review

Snyder (2019) in management research. No quantitative pooling was possible because the designs, constructs and measures of effect were too diverse across the primary studies, making a common quantitative pooling impossible.

INFORMATION SOURCES AND SEARCH STRATEGY

The following databases were searched from January 2009 to December 2025: Scopus, Web of Science, ScienceDirect and Google Scholar. The lower bound is the result of the synthesis of EV consumer-behaviour research after initial barrier studies and the upper bound is the latest evidence for EV consumption in India and Punjab. The Boolean search string for the articles was adoption and behaviour, technology and geography, determinant, barrier, driver, incentive, and infrastructure, with the articles being "electric vehicle*"" OR" "EV"" OR" "plug-in"" OR" "battery electric"" AND" "adoption"" OR" "consumer perception*"" OR" "purchase intention"" OR" "behavioural intention"" OR" "attitude*"" AND" "determinant*"" OR" "barrier*"" OR" "driver*"" OR" "incentive*"" OR" "infrastructure". To increase the regional sensitivity, India specific terms and terms specific to Punjab were added during a second pass to maximise the regional sensitivity. Citation chaining of reference lists of retrieved articles and previous reviews was performed to find further records.

ELIGIBILITY CRITERIA

A priori Eligibility was stated. The studies used included those reporting empirical or systematically reviewed evidence with regard to consumer level determinants, attitudes, intentions or adoption of EVs; published between 2009 and 2025; and provided adequate methodological information to identify a determinant–outcome relationship. The studies that focused only on the engineering or technical features of vehicles, batteries or charging equipment without consumer-behaviour data, those relevant to general transport or transit rather than EVs specifically, editorials, news items and grey literature, in which there was no empirical or systematic method, and those that did not report enough detail at the level of the determinant were excluded. Table 2 summarises the criteria.

Table 2

Table 2 Inclusion and Exclusion Criteria

Dimension	Inclusion	Exclusion
Focus	Consumer determinants, perceptions, attitudes, intentions or adoption of EVs	Purely technical/engineering attributes with no consumer data
Scope	EV-specific; India-relevant or internationally comparative	General transport/transit not specific to EVs
Method	Empirical (survey, SEM, regression, AHP) or systematic review with stated method	Editorial, news, grey literature without empirical/systematic method
Reporting	Sufficient detail to extract a determinant–outcome association	Insufficient determinant-level reporting; overlapping/duplicate samples
Period & language	2009–2025; English language; peer-reviewed	Pre-2009; non-retrievable full text

STUDY SELECTION

A total of 1229 records (1215 from databases and 14 from reference chaining) were returned. Duplicates were eliminated resulting in 917 records screened by title and abstract, 812 of which were easily determined as clearly not relevant to this study. Only 96 (83%) of the 105 reports reported were available for full-text evaluation.A total of 105 reports were retrieved; 9 of these were not available for full text evaluation. In this stage, 76 reports were excluded including with detailed reasons such as: purely technical or engineering focus without consumer data (27), not EV-specific (12), editorial or grey literature without an empirical method (19), not enough reporting at the determinant level (10), overlapping samples (8). All of the 20 studies fulfilled all the criteria and were included in the synthesis. The flow of the PRISMA 2020 is presented in figure 1.

Figure 1

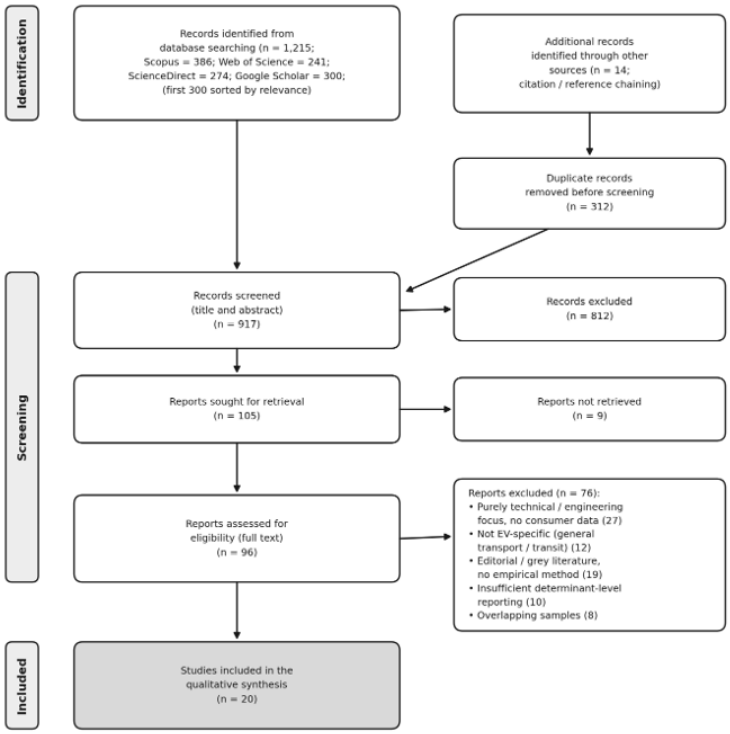

Figure 1 PRISMA 2020 Flow Diagram of the Study Selection Process.

DATA EXTRACTION AND SYNTHESIS

A structured extraction sheet was used to identify the following: author(s), year, geographic setting, research design, sampling approach and sample size, determinants examined, analytical technique, and principal determinant–outcome findings. Evidence was synthesized thematically by coding each determinant by study and counting the number of studies reporting evidence of a significant association which indicated the weight of evidence (Figure 3). Findings were then interpreted in the context of the theories in Section 2 and organized in the sequence of the attitude–intention–adoption pathway, with policy incentives as a moderator. Since the synthesis is qualitative, there was no formal meta-analytic effect pooling and funnel-plot examination of publication bias conducted; methodological limitations of the corpus are discussed transparently in Section 6.

RESULTS

CHARACTERISTICS OF THE INCLUDED STUDIES

Students will examine the characteristics of The Included Studies. Students will analyze the elements of The Included Studies. The 20 papers included cover the time period 2009-2025, and include a mixture of India-specific primary papers, as well as barrier and review papers of international relevance. Most used cross-sectional survey designs which were analysed using descriptive statistics, correlation, regression, factor analysis, the analytic hierarchy process or structural equation modelling and sample sizes were between approximately 150 and more than 360 participants, mostly collected by convenience or purposive sampling in urban areas. India-based studies constitute the bulk of the corpus and there are a few studies which have studied Punjab in isolation. The included studies are summarised in table 3.

Table 3

Table 3 Characteristics of the 20 Included Studies

Study	Context	Design / sample	Key determinants & principal findings
Sovacool and Hirsh (2009)	International	Literature review (PHEV/V2G)	Battery cost, regulatory models and public hesitancy identified as dominant barriers despite large emission-reduction potential
Egbue and Long (2012)	USA	Survey, n=150; factor analysis	Range anxiety (65%), high price (58%) and limited charging (54%) reported as primary barriers

Haustein (2018)	International	Conceptual/empirical review	Gain, normative and hedonic motivations jointly shape adoption intentions
Haustein (2018)	Europe	Empirical	Attitudinal and socio-psychological factors and perceived control central to adoption
Nazneen and Haseeb (2019)	India	Survey, n=200; regression	Environmental benefit positive (β=0.54); upfront cost and infrastructure inhibit 62% of respondents
Adhikari et al. (2020)	Nepal/intl.	AHP, expert survey	Lack of charging stations, weak long-term planning and high price are top-weighted barriers
Ali and Naushad (2022)	India	Survey, n=366; regression	Attitude strongest predictor of intention (β=0.48); PBC and norms secondary
Singh and Arneja (2022)	Punjab	Survey	Cost, awareness and infrastructure shape perception and adoption in Punjab
Hasan (2022)	India	Empirical	Environmental concern and price value significantly drive adoption sentiment
Chandel (2023)	Punjab/India	Survey	Usefulness, environmental concern and cost interact to shape attitudes; context-specific evidence scarce
Nazari et al. (2023)	USA panel	Survey, n=312; logistic reg.	Range anxiety explains 41% of reluctance variance; primary barrier for 33%
Ahamed (2024)	India	Survey, n=300; TPB regression	Attitude (39%) and PBC (24%) explain intention; norms modest; 37% purchase-ready
George and Sureshkumar (2024)	India	Survey, n=210; logistic reg.	60% recognise benefits but only 18% willing to buy; cost (56%), charging (42%) key barriers
Mishra et al. (2024)	India	Survey	Consumer preference mixed on readiness for an all-EV fleet by 2030
Pamidimukkala et al. (2024)	USA	Mixed; SEM, n=320	Perceived usefulness (0.62) and social influence (0.48) explain 54% of intention variance
Kaur and Singh (2024)	Punjab	Survey	Sustainability orientation and incentives support adoption; awareness gaps persist
Bindhya et al. (2025)	India	Empirical analysis	Demographic factors and knowledge gaps add hesitation despite publicised benefits
Das and Sharma (2025)	India	Bibliometric review	Maps a decade of trends; fragmented constructs and limited regional coverage
Kaur Channi (2025)	Ludhiana	Status study	Charging-station and registration growth offset by convenience/reliability concerns
Suchithra et al. (2025)	India	Survey, n=250; regression	65% positive; environmental concern (0.58) and incentives (0.44) strongest predictors

DESCRIPTIVE OVERVIEW

Geographically, there is a substantial representation of the included primary studies from India, a distinct cluster of studies from Punjab Singh and Arneja (2022), Kaur and Singh (2024), Chandel (2023), Kaur Channi (2025), and international studies covering barrier and intention Egbue and Long (2012), Adhikari et al. (2020), Nazari et al. (2023), Pamidimukkala et al. (2024). In terms of methodological approach, the corpus is mainly comprised of cross-sectional, self-reported surveys that are analyzed using regression or less frequently, structural equation modelling; a small minority of papers use multi-criteria techniques like the analytic hierarchy process Adhikari et al. (2020). The distribution of studies is right-skewed with the majority of the studies published from 2022 onwards, indicating the increased focus on Indian EV research in recent years Das and Sharma (2025). The frequency of each determinant being significant throughout the corpus is shown in Figure 3.

Figure 2

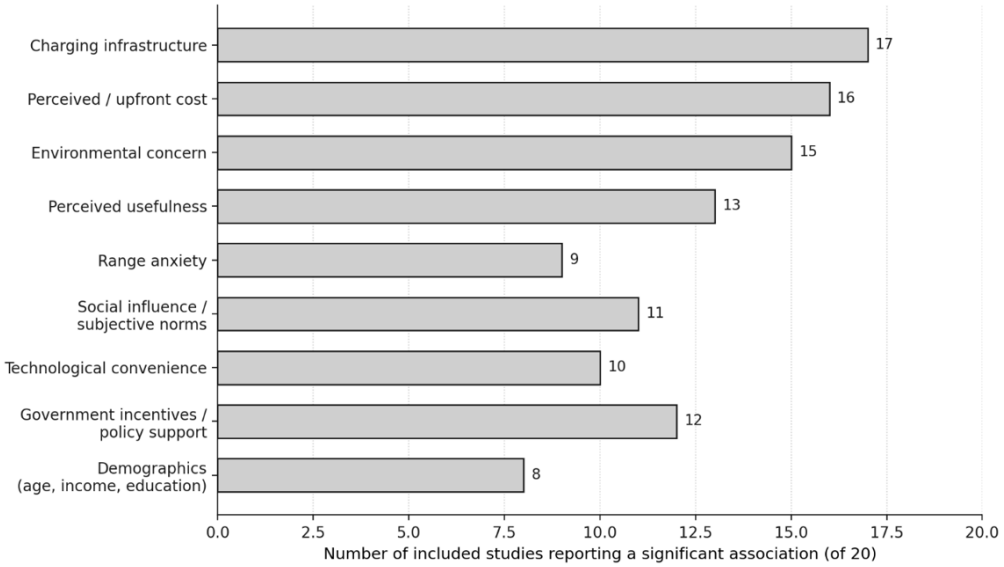

Figure 2 Frequency of Determinants Reported as Significant Across the 20 Included Studies

THEMATIC SYNTHESIS OF DETERMINANTS

CHARGING INFRASTRUCTURE AND RANGE ANXIETY

The most widespread determinant in the corpus is infrastructure adequacy. Low charging station availability is consistently cited as the primary or near-primary barrier to EV adoption, is consistently the top barrier in multi-criteria analyses, and is reported by significant minority populations in survey responses Adhikari et al. (2020), Egbue and Long (2012), George and Sureshkumar (2024). The psychological challenge of infrastructure scarcity is range anxiety, which is the fear of not having enough range and was cited as a significant source of reluctance variance and as the most critical barrier by a third of the respondents in the case of dedicated work Nazari et al. (2023), Egbue and Long (2012). In the case of the Punjab evidence, although registration and charging-station expansion in cities like Ludhiana has started, these concerns remain Kaur Channi (2025), Singh and Arneja (2022).

PERCEIVED AND UPFRONT COST

Cost exists in two forms—the salient purchase premium and perceived value-for-money of the total ownership cost. Among the various barriers, high initial price consistently appears as one of the most significant barriers, whether in Indian samples or in international ones George and Sureshkumar (2024), Egbue and Long (2012), Nazneen and Haseeb (2019). On the other hand, if consumers are able to internalise running cost savings and price value, their sentiment becomes positive Hasan (2022). The cost determinant is related to consumer-value theory that perceived value is a balance of benefits and monetary sacrifice Zeithaml (1988), Sweeney and Soutar (2001) – this is the determinant that fiscal incentives are intended to compensate (mitigate) for.

ENVIRONMENTAL CONCERN

The most consistently positive attitude and intention changeers across the corpus are environmental concern. It was the best predictor of the adoption intention in various surveys conducted in India and had high standardized regression coefficients for purchase intention Suchithra et al. (2025), Nazneen and Haseeb (2019), Hasan (2022). This pattern can be explained using the theory of VBN Stern et al. (1999): When biospheric values and environmental beliefs result in a personal norm to adopt cleaner mobility, this norm is likely to be followed. This public-health co-benefit of electrification is not merely subjective and internalised by consumers—the public-health effects of increased EV penetration is demonstrated through scenario modelling, which has correlated aggressive EV penetration with measurable reductions to premature mortality and transport emissions from particulates Buekers et al. (2014). Importantly, however, environmental concern often doesn't translate into purchase when cost and infrastructure issues get in the way, as is often the case in the intention–action gap covered in Section 4.4.

PERCEIVED USEFULNESS AND TECHNOLOGICAL CONVENIENCE

Perceived usefulness, which refers to the improvement in performance and real-world benefit that can be gained from using EVs, is a strong and consistent predictor of intention, most clearly illustrated when its influence on intention was isolated by structural modelling Pamidimukkala et al. (2024), Ali and Naushad (2022). Technological convenience is the TAM ease-of-use construct, as well as DOI compatibility/complexity, and has a significant impact on attitudes especially for less technological confident segments Davis (1989), Rogers (2003), Chandel (2023). The two constructs go in hand in hand: usefulness inspires, and convenience eliminates obstacles.

SOCIAL INFLUENCE AND SUBJECTIVE NORMS

The social influence and subjective norms are demonstrated through the four items. The subjective norms in TPB is a moderate but consistent determinant. Social influence was significant and had the second highest explanatory weight Pamidimukkala et al. (2024), Ahamed (2024), after perceived usefulness, when measured directly. The findings indicate that the diffusion process is promoted by observed adoption by peers and opinion leaders, which is consistent with the attribute observability in DOI Rogers (2003), Haustein (2018), and norm-based interventions can augment economic interventions.

DEMOGRAPHIC DETERMINANTS

Demographic characteristics, principally age, income and education, qualify the strength of the core determinants rather than acting as independent drivers. Lower awareness and knowledge gaps among particular segments add hesitation even where benefits are publicised Bindhya et al. (2025). Because most studies sampled urban, comparatively affluent respondents through convenience methods, the corpus likely overstates favourable dispositions and under-represents rural and lower-income consumers Das and Sharma (2025), Ahamed (2024).

THE ATTITUDE–INTENTION–ADOPTION PATHWAY AND THE INTENTION–ACTION GAP

The attitude-INTENTION correlation is strong across the studies, with positive attitude predicting greater intentions, and attitude as the most consistent and significant predictor in the Indian studies based on the TPB Ali and Naushad (2022), Ahamed (2024). By comparison, the intention–adoption link is much weaker. Repeatedly, research has reported that significant share of respondents are aware of EV benefits and yet less than one in five or even one in ten plans to purchase an EV in the near term George and Sureshkumar (2024), Nazneen and Haseeb (2019). The missing link between a positive thought and a positive action is the main empirical finding in the literature and is due to costs and infrastructure Bindhya et al. (2025), Egbue and Long (2012). The S – O – R mechanism is explained in the positive organismic states are necessary, but not sufficient, for the adoption response in the face of unfavorable situational stimuli Mehrabian and Russell (1974).

GOVERNMENT INCENTIVES AND POLICY SUPPORT AS A MODERATOR

Policy incentives will be included in the corpus less as a direct determinant of attitude but as a moderator that enhances the intention to adopt behavior. Subsidies and tax waivers reduce the effective cost and infrastructure investments increase perceived control, which reduces the intention–action gap Suchithra et al. (2025), Adhikari et al. (2020), Kaur and Singh (2024). In an Indian and a Punjab context, it is the FAME II scheme and the Punjab State EV Policy 2022 that provide precisely such levers NITI Aayog (2024), Government of Punjab (2022), Mercom India (2022). However, the moderating influence is called upon more than it is rigorously modelled: few studies attempt to quantify policy empirically as an actual interaction term within a structural model, especially when estimating the boundaries of its effects Adhikari et al. (2020), Egbue and Long (2012). The determinants and mediating chain are combined with the policy moderator in Figure 2.

Figure 3

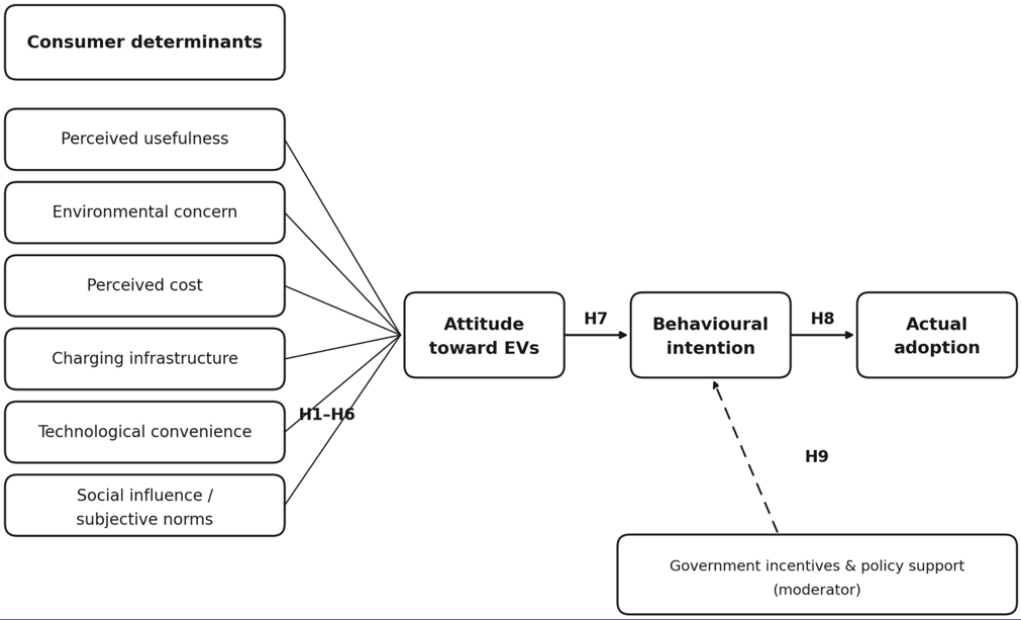

Figure 3 Integrated Conceptual Framework Synthesized from the Included Evidence.

DISCUSSION

The three review questions are answered in the synthesis one after another. The determinants that are most consistently linked with EV attitudes and intentions on RQ1 include charging infrastructure, perceived/upfront cost and environmental concern, followed by perceived usefulness, social influence, and range anxiety associated with EVs. This order is consistent with the international evidence, as well as the theoretical assumption that a pro-environmental motivation (VBN) needs to be supported by a perceived usefulness and ease (TAM), made diffusible by infrastructure and compatibility (DOI) and reinforced by norms (TPB).

The pathway of attitude–intention–adoption is asymmetric for RQ2: upstream (attitude to intention) is strong, while the downstream (intention to adoption) is weak. The most policy-relevant finding in the present study is the persistent intention-action gap, which means that increased attitude will not lead to increased adoption unless the cost and infrastructure stimuli that restrain the response to the action are raised at the same time George and Sureshkumar (2024), Egbue and Long (2012), Mehrabian and Russell (1974).

The intention–adoption relationship is more likely to be moderated by policy support on RQ3 than to be primarily caused by policy support. The evidence from India is anecdotal and of low methodological quality, and focuses on description of incentives, not on estimated interaction effects Adhikari et al. (2020), Suchithra et al. (2025). This is an actual gap, as FAME II and state policies play a pivotal role in India's EV initiative NITI Aayog (2024), Government of Punjab (2022).

A striking aspect of the synthesis is the similarity of barriers ranking found in both the Indian and international samples, and the difference in the relative strength of the barriers. The costs, infrastructure and range barrier are the more prominent barriers in both settings, as is the upfront-price barrier in the price-sensitive Indian markets, the motivational pull of gain, normative and hedonic considerations in both Egbue and Long (2012), Sovacool and Hirsh (2009), Haustein (2018), Rezvani et al. (2018), Nazneen and Haseeb (2019). This implies that theories built and tested extensively in Western contexts are fairly portable to India when it comes to what factors are relevant, but that the relative importance of these factors – and consequently the design of interventions – should be localised.

RESEARCH GAPS

There are four gaps from the synthesis. First, most studies focus on either factor or attitude level models and fail to link up the entire chain of attitude → intention → adoption while controlling for interdependence Ali and Naushad (2022), Suchithra et al. (2025). Second, the role of policy support is not typically measured in a structural framework which is specifically designed for emerging economies Adhikari et al. (2020), Egbue and Long (2012). Thirdly, urban convenience samples do not capture the demographic and regional diversity, reducing generalisability Ahamed (2024), Das and Sharma (2025). Fourthly, the prevalent cross-sectional, self-reported design does not allow for the intention–action gap to be causally explained; that is, no study included followed the same consumers from intention to actual purchase. These gaps are mapped to forward agenda in Table 4

Table 4

Table 4 Research Gaps and Future Agenda

Identified Gap	Recommended Future Direction
Fragmented, attitude-only models	Estimate the full attitude–intention–adoption chain with SEM/PLS, controlling for interdependence among determinants
Policy treated descriptively	Model incentives and infrastructure as formal moderators/interaction terms within structural frameworks
Urban convenience samples	Use stratified, probability-based sampling spanning rural and lower-income segments across Punjab's major cities
Cross-sectional, self-reported designs	Adopt longitudinal and behavioural-data designs that follow consumers from intention to realised adoption
Western instruments in Indian contexts	Validate and culturally adapt measurement scales for Indian and Punjabi consumers

THEORETICAL AND PRACTICAL IMPLICATIONS

Theoretically, the review provides evidence regarding the usefulness of a nested (S–O–R) approach to the TPB, TAM, DOI and VBN constructs, and not just one of them alone; the TPB determinants fit the stimuli, the attitude – intention chain the organism, and the adoption, the response. The asymmetry of the pathway suggests that the best interventions are along the downstream barriers: targeted purchase incentives, dense and visible charging network, credible long-term policy signalling and awareness-building; the latter should build on, not supplant, the former NITI Aayog (2024), Government of Punjab (2022), Adhikari et al. (2020). The evidence suggests that for manufacturers, the clarity of total-cost-of-ownership, after-sales assurance and the clear convenience of EV use in the day-to-day will be the deciding factors to overcome the intention–action gap George and Sureshkumar (2024), Chandel (2023).

LIMITATIONS

These findings are subject to a number of limitations. This synthesis was qualitative, and heterogeneity in both constructs, metrics and designs prevented pooling by meta-analysis, with determinant weights in Figure 3 based on the number of reported significances. The corpus included, which is protocol-based, is largely made up of cross-sectional surveys with convenience sampling, which carry with them many of the pitfalls of those sampling procedures—common-method and self-selection bias. The review focused on India-relevant evidence, thereby enhancing the contextual validity, but sacralising the transferability to other markets. Lastly, as in any review, the search, screening and extraction process was judgemental, and grey literature was purposefully omitted, which could underestimate emerging/ practitioner evidence Page et al. (2021), Snyder (2019).

CONCLUSION

A literature review based on PRISMA methodology was conducted and 20 studies were consolidated that dealt with determinants of EV adoption with a focus on India and Punjab. Overall, the evidence points to charging infrastructure, perceived and initial cost, and environmental concern as the most important factors, influencing a pathway of attitude–intention–adoption for which there is a long-standing intention–action correlation, in which the downstream component is weaker. One of the moderating factors that can close this gap is the government incentives (GI) and policy support (PS), which are not modeled in existing literature. The review presents a framework of fragmenting findings on theory and a conceptual framework to build on that theory and a prioritised research agenda, which can serve as a basis for theory-driven, longitudinal and regionally representative studies and for evidence-informed policy for achieving sustainable mobility faster in Punjab and similar emerging-economy markets.

ACKNOWLEDGMENTS

None.

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