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AWARENESS, ATTITUDES, AND ADOPTION INTENTIONS TOWARD ELECTRIC VEHICLES AMONG MALAYSIAN UNDERGRADUATE YOUTH

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Abstract:

The global transition toward electric vehicles (EVs) is central to sustainable mobility, yet adoption remains uneven across regions and social groups due to affordability, infrastructure provision, perceived risk, and trust in emerging technologies. Malaysia represents a salient Southeast Asian case where strong policy ambition and growing market visibility coexist with relatively low EV penetration, highlighting the importance of consumer readiness. Given the structural significance of undergraduate youth as future vehicle buyers, this study examines EV awareness, attitudes, and adoption intentions among Malaysian undergraduates. Drawing on a nationwide cross-sectional online survey of 328 respondents, the study employs descriptive and exploratory analysis to profile awareness and familiarity, evaluative attitudes, adoption intentions, and key conditioning factors. The findings reveal near-universal awareness of EVs alongside limited technological familiarity, indicating a pronounced awareness–familiarity gap. Attitudes are mixed but not polarised, combining positive evaluation with substantial neutrality. While environmental friendliness is the most salient perceived benefit, adoption intentions remain strongly conditional, shaped by concerns over charging infrastructure, battery durability, affordability, and after-sales support. Respondents prioritise durability, maintenance cost, and service reliability, and display clear price and range thresholds. Brand perceptions are anchored in

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functional credibility, with Tesla and selected Chinese brands perceived as reliable, and China widely viewed as leading Malaysia's EV industry. Overall, Malaysian undergraduates exhibit "rational environmentalism," endorsing EV sustainability benefits while screening adoption through feasibility and risk considerations. The study advances a constraint-sensitive understanding of EV adoption intention in emerging markets.

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Keyword:

Adoption Intention; Affordability; Brand Trust; Electric Vehicles; Infrastructure; Malaysia; Undergraduate Youth.

Introduction

The global transition toward electric vehicles (EVs) has become a central component of sustainable mobility strategies, driven by concerns over climate change, energy security, and urban air pollution. As road transport remains a major source of greenhouse gas emissions, governments worldwide have accelerated vehicle electrification as part of broader decarbonisation agendas (International Energy Agency, 2023). Beyond environmental objectives, EV diffusion is increasingly embedded in industrial policy and technological competition, particularly in relation to battery production, charging infrastructure, and digital mobility systems. Nevertheless, despite rapid technological advances and policy momentum, EV adoption remains uneven across regions and social groups. This unevenness reflects not only differences in infrastructure and incentives, but also variations in consumer awareness, perceived risks, affordability, and trust. EV transitions are therefore best understood as socio-technical processes in which consumer perceptions and behavioural intentions play a decisive role.

Within Southeast Asia, Malaysia represents a significant case of an emerging EV market characterised by ambitious policy goals alongside persistent structural constraints. Recent increases in EV sales suggest growing market visibility and interest, and national policy discourse increasingly frames EV development as both an environmental essential and an economic opportunity aligned with long-term industrial upgrading. Yet EV penetration remains low compared to mature markets, indicating that supply-side expansion alone is insufficient to ensure widespread uptake. Consumer readiness understood in terms of awareness, attitudes, and adoption intentions thus becomes critical in determining whether policy aspirations translate into sustained market transformation. Analysing how different social groups evaluate EVs is therefore essential for assessing the feasibility and trajectory of Malaysia's EV transition.

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Among these groups, youth and undergraduate students in particular occupy a structurally significant position. As future workforce entrants and prospective vehicle owners, undergraduates constitute a latent demand segment that may shape medium to long-term EV adoption. At the same time, their current socioeconomic position is often marked by limited income, dependence on family resources, and constrained purchasing power. This produces a distinctive consumption orientation in which environmental ideals coexist with pragmatic concerns about cost, reliability, and feasibility. Prior research suggests that younger consumers tend to express stronger environmental concern than older cohorts, yet such concern does not necessarily translate into adoption of green technologies when financial and infrastructural barriers persist (Rezvani, Jansson, & Bodin, 2015); (Sovacool, Axsen, & Sorrell, 2018). Undergraduate youth should therefore be understood neither as automatic early adopters nor as resistant consumers, but rather as conditional adopters whose intentions are shaped by both values and structural constraints.

Despite a growing body of EV adoption research, important gaps remain. Much empirical work focuses on consumers in advanced economies or on existing vehicle owners, leaving emerging markets and younger, pre-purchase cohorts underexplored. Studies that do examine youth attitudes often emphasise environmental values and social norms, while paying less attention to structural determinants such as charging infrastructure, price thresholds, battery durability, and after-sales support factors that are especially critical for first-time buyers. Moreover, adoption research frequently assumes a linear progression from awareness to positive attitudes and then to adoption intention. Evidence from emerging markets, however, suggests that high awareness may coexist with uncertainty, hesitation, or deferred adoption when perceived risks and practical barriers remain unresolved (Hardman, Shiu, & Wilckens, 2016). These limitations highlight the need for context-specific, empirically grounded studies that capture the complexity of youth decision-making in transitional EV markets such as Malaysia.

Against this backdrop, the present study examines awareness, attitudes, and adoption intentions toward EVs among Malaysian undergraduate youth using original nationwide survey data. Specifically, it assesses the level of EV awareness and familiarity, analyses attitudes by identifying perceived benefits and concerns, and examines adoption intentions through the determinant's respondents prioritise, including affordability, infrastructure accessibility, performance expectations, and brand reliability. By focusing on undergraduate youth as a distinct analytical category, the study contributes to the limited literature on EV adoption in emerging Southeast Asian contexts. Analytically, it advances a constraint-sensitive understanding of adoption intention as a context-dependent outcome rather than a direct expression of pro-environmental attitudes. Practically, the findings offer insights for policymakers and industry stakeholders seeking to design youth-sensitive strategies that align sustainability ambitions with economic and infrastructural realities in Malaysia's evolving EV ecosystem.

Literature Review

Electric Vehicle Adoption and Consumer Behavior

The literature on electric vehicle (EV) adoption consistently shows that diffusion is shaped by a combination of economic, infrastructural, and psychological factors. Synthesising prior research, Rezvani, Jansson, and Bodin (2015) identify upfront purchase cost as one of the most persistent barriers, while lower operating costs and environmental benefits can function as

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important adoption drivers. However, these drivers are highly context-dependent and willingness to adopt is often contingent on charging convenience, perceived technological reliability, and policy measures that reduce financial risk (Rezvani, Jansson, & Bodin, 2015).

Beyond headline prices, consumers frequently evaluate EVs through a broader risk-value calculus that includes depreciation uncertainty, battery replacement costs, and long-term maintenance expectations. Battery-related anxieties such as degradation, longevity, and replacement cost is featured prominently as a risk perception dimension that suppresses adoption intention, particularly where consumer experience remains limited and information is obtained indirectly (Rezvani, Jansson, & Bodin, 2015). In parallel, charging infrastructure is widely recognised as a decisive constraint. Infrastructure shapes both objective usability and psychological confidence, visible and reliable charging networks signal system readiness and can reduce uncertainty. Research comparing current pioneers with potential future buyers indicates that charging access, especially convenient recharging options can differentiate those willing to adopt now from those who prefer to wait (Axsen, Goldberg, & Bailey, 2016). Range anxiety is therefore better understood as an interaction between battery capacity and confidence in charging availability, route planning, and charging speed, rather than as a purely technical issue (Rezvani, Jansson, & Bodin, 2015); (Axsen, Goldberg, & Bailey, 2016).

A further refinement in the adoption literature is the recognition that adopters are heterogeneous and that findings based on current owners may not generalise to non-owners. Hardman, Shiu, and Steinberger-Wilckens (2016) show that even among adopters, motivations and perceived constraints vary across socio-economic segments, implying that owner-based studies may understate the uncertainties faced by prospective buyers. Consequently, researchers increasingly focus on intenders and potential adopters, whose decisions are often more sensitive to price, charging convenience, and perceived durability (Hardman, Shiu, & Wilckens, 2016).

In emerging markets, EV transitions are additionally shaped by national policy capacity and infrastructure integration. Malaysia-based studies echo the broader literature by highlighting recurrent constraints such as high upfront costs, limited charging infrastructure, and concerns over battery performance and reliability (Muzir & et al., 2022); (Tan, Tee, & et al., 2025). Evidence also suggests that purchase intention in Malaysia is dependent on affordability perceptions and infrastructure readiness, reinforcing the importance of aligning incentives and market offerings with consumer thresholds and confidence in service ecosystems (Lim, Perumal, & Ahmad, 2019); (Nor Azila & et al., 2025).

Youth, Technology Adoption, And Sustainable Consumption

Research on youth and sustainable consumption is often framed through a value–action tension where young people may express stronger pro-environmental values, yet their behaviours are frequently constrained by resources and structural conditions. This dynamic is consistent with the value–action gap literature, which argues that awareness and positive attitudes do not reliably translate into behaviour when economic costs, convenience barriers, and contextual constraints remain high (Kollmuss & Agyeman, 2002). EV adoption amplifies this tension because it is capital-intensive, involves long-term ownership risk, and depends on external infrastructure systems.

While youth are sometimes conceptualised as more open to innovation, EVs differ from many consumer technologies because adoption requires substantial financial capacity and confidence in a broader ecosystem. As a result, youth EV adoption intention is often conditional with sustainability-oriented evaluations may coexist with hesitation driven by uncertainty about charging access, resale value, and battery durability (Rezvani, Jansson, & Bodin, 2015). Youth decision-making is also shaped by informational environments such as online reviews, peer discourse, and social media can increase exposure but can also heighten uncertainty in transitional markets where EV ownership remains uncommon and personal experience is limited.

Malaysia-focused research similarly suggests that pro-environmental attitudes and incentives matter, but economic feasibility remains central. Studies on green vehicle purchase intention highlight that favourable attitudes may translate into intention only when structural supports, especially infrastructure readiness are perceived as adequate (Lim, Perumal, & Ahmad, 2019); (Nor Azila & et al., 2025). Behavioural models further clarify these mechanisms. In the Theory of Planned Behavior, intention depends not only on attitudes but also on perceived behavioural control, which may be particularly crucial for youth given cost and charging constraints (Ajzen, 1991). The Technology Acceptance Model likewise underscores perceived usefulness and ease of use as key predictors of intention in EV contexts, ease of use is closely tied to charging convenience, range sufficiency, and service accessibility (Davis, 1989). Together, these perspectives suggest that undergraduate EV intention is best approached as constrained preference formation and endorsement of EVs can exist alongside deferred adoption until feasibility and reliability are improved.

Awareness, Attitude and Adoption Intentions

A persistent challenge in EV research concerns the relationship between awareness, attitudes, and adoption intentions. Although many accounts imply a linear sequence from awareness to positive attitudes to adoption, behavioural research cautions that knowledge and concern often fail to translate into action under structural constraints that forms a pattern documented in environmental behaviour studies (Kollmuss & Agyeman, 2002). EV adoption exemplifies this gap because purchase decisions involve high financial stakes, infrastructure dependence, and uncertainty over long-term performance and resale outcomes.

Within EV studies, awareness typically refers to recognition of EVs as a product category, whereas familiarity denotes deeper understanding of practical ownership features such as charging routines, battery degradation, and total cost of ownership. Importantly, awareness and positive attitudes may be necessary but insufficient conditions and intention tends to strengthen when consumers perceive constraints as manageable and the technology as compatible with daily mobility routines (Rezvani, Jansson, & Bodin, 2015). Attitudes themselves reflect perceived benefits (environmental, cost, comfort) balanced against perceived risks (charging inconvenience, battery cost, reliability uncertainty). Risk perceptions are also socially shaped through information flows and market maturity, and non-owners are often more sensitive to uncertainties than adopters with direct experience (Axsen, Goldberg, & Bailey, 2016).

For these reasons, intention is widely used as an analytically valuable dependent variable, especially in emerging markets and among younger cohorts for whom actual purchase behaviour may be temporally distant. Intention-based research can diagnose readiness and identify which barriers inhibit commitment, consistent with TPB and TAM frameworks that

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treat intention as a proximal predictor under constraints (Ajzen, 1991); (Davis, 1989). Nevertheless, intention in EV markets is typically conditional, shifting with price changes, infrastructure development, and trust-building mechanisms such as warranties and after-sales support. Malaysian research likewise suggests that infrastructure readiness moderates whether positive attitudes convert into purchase intention (Nor Azila & et al., 2025), and that affordability thresholds and system-level confidence are critical triggers for intention formation (Lim, Perumal, & Ahmad, 2019); (Muzir & et al., 2022). Overall, the literature supports a non-linear and constraint-sensitive view, conforming awareness may be high without deep familiarity, attitudes may be positive yet cautious and intention may remain deferred until enabling conditions improve.

Analytical Framework

This study adopts an analytical framework that conceptualises awareness, attitudes, and adoption intentions as distinct yet interrelated dimensions of consumer readiness for electric vehicle (EV) adoption. Grounded in established behavioural and technology-adoption scholarship, the framework recognises that EVs constitute a high-cost, infrastructure-dependent technology. Accordingly, adoption intention is treated not as an automatic extension of favourable attitudes, but as a conditional orientation shaped by feasibility constraints and trust in the surrounding mobility ecosystem.

Awareness is defined as recognition of EVs as a vehicle category and basic understanding of their electric propulsion. While commonly operationalised as having "heard of" EVs or being exposed to EV-related information, such awareness does not necessarily imply the capacity to evaluate ownership realistically. The framework therefore distinguishes awareness from familiarity, understood as deeper cognitive readiness encompassing knowledge of charging routines, battery performance and degradation, maintenance expectations, and total cost of ownership. This distinction is well established in sustainable consumption and technology adoption research, which warns against equating general awareness with actionable knowledge (Kollmuss & Agyeman, 2002); (Rezvani, Jansson, & Bodin, 2015).

Attitudes refer to individuals' evaluative orientations toward EVs, formed through perceived benefits and perceived risks. Consistent with the Theory of Planned Behavior (TPB), attitudes influence behavioural intention by shaping whether a behaviour is evaluated positively or negatively (Ajzen, 1991). In the EV context, attitudes typically reflect environmental benefits, anticipated operating cost savings, and driving experience, balanced against concerns about battery lifespan, charging inconvenience, and resale value. Given the relative novelty of EVs in many emerging markets, attitudes may also incorporate symbolic or reputational meanings, although empirical studies suggest that functional reliability concerns tend to dominate consumer evaluation (Rezvani, Jansson, & Bodin, 2015). Importantly, attitudes that are not necessarily unidirectional with individuals may simultaneously endorse the sustainability promise of EVs and remain uneasy about feasibility. Such ambivalence is analytically significant, as it helps explain why positive attitudes may coexist with hesitant or deferred adoption intentions.

Adoption intentions are defined as self-reported willingness or likelihood to purchase an EV within a foreseeable future. In behavioural research, intention is widely regarded as the most proximal predictor of behaviour when actual behaviour is temporally distant, financially demanding, or structurally constrained (Ajzen, 1991). This is particularly relevant for

undergraduate youth, many of whom are not immediate vehicle buyers but nevertheless form evaluative judgments that shape future demand. The Technology Acceptance Model (TAM) similarly positions behavioural intention as the key outcome of perceived usefulness and perceived ease of use (Davis, 1989). In EV adoption, perceived usefulness is often associated with environmental benefit and operating efficiency, while perceived ease of use maps onto charging convenience, driving range sufficiency, and service accessibility. The framework extends beyond classic TAM assumptions by recognising EV adoption as durable-good decision-making under uncertainty, where perceived risk and infrastructure dependence are central (Rezvani, Jansson, & Bodin, 2015).

The relationship among awareness, attitudes, and adoption intention is therefore non-linear and constraint sensitive. Awareness functions as a necessary entry condition for evaluation, but it does not guarantee favourable attitudes or strong intention. Greater familiarity may support more informed evaluation, yet it can also heighten awareness of practical barriers, thereby reinforcing caution. While attitudes are expected to influence intention, consistent with TPB, this influence weakens when feasibility constraints dominate. Adoption intention is thus conceptualised as a function of evaluative orientation combined with perceived feasibility and trust, reflecting the broader value-action gap identified in environmental behaviour research (Kollmuss & Agyeman, 2002).

To operationalise this conditionality, the framework incorporates three moderating factors that are especially crucial in emerging EV markets which is price, charging infrastructure accessibility, and brand trust.

Price operates as a structural constraint that can suppress intention even when attitudes are favourable, as high upfront costs intensify perceived risk in capital-intensive purchases (Rezvani, Jansson, & Bodin, 2015). Charging infrastructure accessibility moderates intention by shaping perceived behavioural control and ease of use, inadequate or unreliable charging increases uncertainty, reinforces range anxiety, and sustains a wait-and-see orientation (Axsen, Goldberg, & Bailey, 2016). Brand trust functions as a risk-reduction mechanism, allowing consumers to infer reliability, warranty credibility, and service support in contexts where direct ownership experience is limited. Strong brand trust can therefore strengthen intention under uncertainty, while weak trust may magnify perceived risk and inhibit adoption (Rezvani, Jansson, & Bodin, 2015).

Based on this framework, the study proceeds analytically in three stages. It first maps the distribution of awareness and familiarity among Malaysian undergraduates, distinguishing surface recognition from deeper knowledge. It then examines attitudes by identifying perceived benefits and concerns that structure evaluative orientation. Finally, it analyses adoption intentions and key determinants, interpreting intention as conditional on affordability, infrastructure readiness, and brand trust. The principal contribution of this framework lies in integrating classical intention models with EV-specific structural constraints, offering a context-sensitive explanation for why high awareness may coexist with cautious attitudes and deferred adoption intentions among undergraduate youth. In doing so, it bridges consumer behaviour theory and the socio-technical realities of mobility transitions in emerging markets such as Malaysia.

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Methodology

This study employs a quantitative, cross-sectional survey design to examine awareness, attitudes, and adoption intentions toward electric vehicles (EVs) among Malaysian undergraduate youth. A survey-based approach is appropriate given the exploratory nature of EV adoption in Malaysia and the study's focus on a cohort that is not yet fully embedded in the private vehicle market. Measuring adoption intention rather than actual ownership is consistent with established practice in technology adoption research, particularly where behaviour is temporally distant, financially demanding, or structurally constrained.

The target population comprises Malaysian undergraduate students aged 16 to 30, reflecting a transitional cohort approaching future vehicle-purchasing stages while remaining economically and institutionally shaped by student status. Eligibility required respondents to fall within the specified age range and to be enrolled in undergraduate studies at the time of participation. Data were collected nationwide over a four-week period using an online questionnaire. Online administration facilitated access to geographically dispersed respondents and supported candid reporting of perceptions and intentions under conditions of anonymity.

A non-probability, convenience-based sampling strategy was used, with participants recruited through student networks, university-affiliated channels, and peer circulation via social media. While this approach does not produce a statistically representative sample, it is appropriate for identifying broad patterns of awareness, evaluative orientation, and conditional adoption intention in an emerging market context. The final dataset consists of 328 valid responses, with 46.34% female and 53.66% male respondents. Most participants were aged between 16 and 25 (94.51%) and reported being actively enrolled as students (93.29%), consistent with the study's analytical focus. A non-probability convenience approach was adopted because the study targets a geographically dispersed pre-purchase cohort for which no national sampling frame is available. In the absence of an accessible database of Malaysian undergraduates, online recruitment through university networks and peer circulation provides a practical mechanism to obtain an initial readiness profile. Given the exploratory objective, findings are interpreted as indicative patterns within the achieved sample rather than as population-level estimates.

Prior to analysis, data screening was conducted to ensure relevance and internal consistency. Responses failing to meet age or enrolment criteria were excluded, and submissions with substantial missing information on core variables were removed. Given the descriptive and exploratory emphasis, missing data were handled conservatively, with item-level analyses based on valid responses only and no imputation applied.

The survey instrument was structured to reflect the analytical framework linking awareness, attitudes, and adoption intentions, while capturing key constraints relevant to EV adoption. After demographic items, respondents were asked about EV awareness and familiarity, distinguishing basic recognition from self-assessed understanding of EV technology and ownership-related features. Attitudinal measures captured overall perceptions of EVs alongside perceived benefits (e.g., environmental friendliness, energy cost savings, driving experience) and perceived concerns (e.g., charging infrastructure availability, battery lifespan and replacement cost, high purchase price).

Adoption intention was measured through respondents stated likelihood of purchasing an EV in the future. To contextualise intention formation, the questionnaire further assessed decision-

making criteria, including the importance of durability, maintenance cost, after-sales service, price, features, and design, as well as acceptable price ranges and driving range expectations. Given the infrastructural dependence of EVs, perceived accessibility of charging facilities in respondents' local areas was also measured, approximating perceived behavioural control and ease of use. In addition, brand-related perceptions were captured to account for trust and risk-reduction intuition, including factors shaping brand perception, awareness of selected EV brands, perceived brand reliability, perceptions of national leadership in Malaysia's EV industry, and the influence of car reviews and online information sources.

The analytical strategy is primarily descriptive and exploratory. The analysis maps an initial empirical profile of undergraduate EV readiness in Malaysia, focusing on the distributions of awareness and familiarity, attitudinal positions, adoption intention levels, and perceived feasibility constraints. These patterns are interpreted in relation to the study's analytical framework linking awareness, attitudes, and intention, as well as established EV adoption research that identifies cost, infrastructure, and perceived risk as key barriers. Frequencies and percentages are used to summarise patterns of awareness, familiarity, attitudes, adoption intentions, perceived benefits and concerns, affordability thresholds, range expectations, infrastructure accessibility, and brand perceptions. Where relevant, exploratory comparisons are used to aid interpretation, such as contrasting intention patterns across perceived charging accessibility or behavioural categories. These comparisons are interpreted cautiously as indicative associations rather than causal or generalisable relationships, consistent with the study's sampling design and objectives.

Ethical considerations were observed throughout the research process. Participation was voluntary, respondents were informed of the study's purpose, and no personally identifiable information was collected. All findings are reported in aggregate form, in line with established ethical standards for social science research involving human participants.

Overall, this methodological approach provides a transparent and context-sensitive foundation for examining EV adoption readiness among Malaysian undergraduate youth, enabling systematic analysis of how awareness, attitudes, and adoption intentions interact under conditions of economic and infrastructural constraint.

Findings

This section reports the empirical results of the undergraduate youth survey on electric vehicles (EVs) in Malaysia. The findings are organised around four themes that correspond to the analytical framework: (1) awareness and familiarity, (2) attitudes, (3) adoption intentions and key determinants, and (4) brand perceptions and market imaginaries. Throughout, results are presented descriptively using frequencies and percentages to establish an evidence-based profile of youth readiness for EV adoption. As this is a cross-sectional survey based on non-probability sampling, interpretations are framed as indicative patterns within the achieved sample rather than population-level estimates (TCLI, 2025).

Awareness And Familiarity with Electric Vehicles

A first and striking finding is the near-universal recognition of EVs among Malaysian undergraduates. In the sample, 98.78% of respondents reported that they had heard about EVs, while only 1.22% indicated no knowledge of EVs (TCLI, 2025). This suggests that EVs have

become a salient topic within youth discourse and media environments, consistent with Malaysia's broader market expansion and policy attention. However, high recognition does not translate into deep technological understanding. When respondents were asked about their familiarity with EV technology, only 24.39% reported being familiar with EV technology, including 5.79% who were very familiar and 18.60% who were somewhat familiar (TCLI, 2025). Conversely, the majority signalled limited familiarity: 46.95% described themselves as not familiar, 26.22% as familiar in a weak sense (i.e., awareness without confidence), and 2.44% as totally not familiar (TCLI, 2025). Taken together, these distributions indicate a pronounced gap between broad awareness and substantive knowledge depth.

This awareness–familiarity gap is analytically consequential. It implies that many respondents may be forming evaluations of EVs without a strong grasp of ownership-related practicalities such as charging routines, battery performance, maintenance patterns, and warranty conditions. In emerging markets, such informational asymmetry can contribute to cautious or contradictory assessments because individuals often rely on indirect signals from peer narratives, online reviews, brand reputation, and media framing to infer risk and feasibility (TCLI, 2025). In this dataset, the high "heard of EVs" rate therefore reflects public visibility rather than technological confidence. Put differently, EVs appear to be widely known as a concept, but still partially unfamiliar as a lived consumer technology.

Further evidence supporting this interpretation can be observed in respondents stated preferences regarding the type of vehicle they would prefer to buy in the future. Although EV awareness is extremely high, only 14.63% indicated a preference for purchasing an EV. In contrast, 46.04% preferred hybrid vehicles and 39.33% preferred conventional fuel-based cars (petrol/diesel) (TCLI, 2025). This pattern suggests that EVs are not yet the dominant aspirational option for many undergraduates. Hybrids may be perceived as a transitional technology that offers some environmental and cost benefits while retaining the perceived convenience and infrastructural familiarity of internal combustion vehicles. In this sense, the preference distribution is consistent with a transition logic in youth mobility preferences with respondents recognizing EVs, but many gravitate toward intermediate or conventional options, potentially due to perceived uncertainty or perceived barriers surrounding EV ownership.

The survey also indicates that direct exposure to EV ownership remains limited within the youth cohort. Only 7.93% of respondents reported that they or their family members own an EV (TCLI, 2025). This relatively low ownership rate is important for interpreting the behavior and intention measures reported in subsequent sections. A large portion of respondents are evaluating EVs without household-level experience, which often increases reliance on general impressions rather than on experiential learning. In addition, low household ownership among undergraduates may reflect life-stage constraints with undergraduate youth often having limited purchasing power, are less likely to own private vehicles independently, and may depend on family decisions for major purchases. This introduces a generational or life-course dimension to EV adoption readiness, even if youth are aware of EVs and view them favourably, they may not have agency over vehicle purchasing decisions, at least in the near term (TCLI, 2025).

Taken together, the findings in this subsection point to a structural profile of youth readiness characterised by high cognitive exposure but constrained experiential familiarity. Awareness is widespread, but knowledge depth is limited with household ownership is low, and vehicle preference leans more strongly toward hybrid and fuel-based options than toward EVs. This

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combination suggests that, within the achieved sample, EV adoption may currently be in a pre-mainstream phase among undergraduates that has been recognised and discussed but not yet normalised as a preferred personal purchase.

Attitude Toward Electric Vehicles

Despite limited familiarity and low household ownership, respondents' overall attitudes toward EVs are not predominantly negative. Rather, the distribution suggests a mixed profile combining positivity with substantial neutrality. In the survey, 45.73% of respondents expressed a positive perception of EVs, comprising 8.84% very positive and 36.89% somewhat positive (TCLI, 2025). At the same time, an equally notable proportion, 45.73% reported a neutral perception (TCLI, 2025). Negative perceptions were present but relatively limited with 5.79% reported a negative perception and 2.74% reported a very negative perception (TCLI, 2025). In aggregate, this indicates that Malaysian undergraduates are not broadly rejecting EVs however, neutrality constitutes a major attitudinal position and arguably captures an important wait-and-see segment in the emerging EV market.

The presence of a large neutral group can be interpreted as a form of cautious openness. In practical terms, neutrality may indicate incomplete information, uncertainty about feasibility, or ambivalence produced by competing evaluations (e.g., sustainability benefits versus infrastructural inconvenience). This interpretation is supported by the fact that respondents simultaneously identify strong perceived advantages and fundamental perceived concerns. When asked to identify the biggest benefit of EVs, the most frequently selected benefit was environmental friendliness (zero emissions), cited by 52.44% of respondents (TCLI, 2025). This indicates that sustainability narratives are crucial among undergraduates and that the environmental positioning of EVs resonates as a key advantage. The next most frequently cited benefits were energy cost saving (17.68%) and a quiet and smooth driving experience (17.38%) (TCLI, 2025). A smaller proportion selected government incentives (subsidies, tax benefits) (6.40%), while 3.35% indicated they were not sure, and 2.74% stated there was no benefit (TCLI, 2025).

These benefit perceptions suggest that undergraduate youth recognise EVs not only as an environmental solution but also as a technology associated with economic efficiency and improved driving comfort. Notably, government incentives were not the dominant perceived benefit, which may reflect either limited awareness of policy instruments among youth or the possibility that incentives are not seen as decisive compared to more intrinsic attributes such as environmental and operating cost advantages. The benefit pattern also indicates that respondents' positive attitudes are grounded in relatively standard EV value propositions that have been prominent in public discourse.

However, the perceived benefits are counterbalanced by pronounced perceived risks and constraints. When asked about the biggest concern regarding EVs, respondents most frequently selected limited charging infrastructure (40.85%) (TCLI, 2025). This was followed closely by concerns about battery lifespan and replacement cost (35.67%) (TCLI, 2025). A further 11.59% identified high initial setup cost as their biggest concern, while 7.32% selected performance compared to petrol and diesel cars (TCLI, 2025). Only 0.61% reported that there was nothing to be concerned about, and 3.96% indicated uncertainty (not sure) (TCLI, 2025). These concern distributions align with the typical set of barriers identified in EV adoption research, but here

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they are especially important because they help explain why neutrality remains large even when positivity is present.

From the standpoint of behavioural structure, the data indicate that infrastructure and battery-related risks dominate youth concerns, more than general performance concerns or even upfront cost. This does not mean that affordability is unimportant, it suggests that when forced to select the single biggest concern, many respondents view the EV ecosystem (charging networks and battery reliability) as the most fundamental source of uncertainty. Such concerns can plausibly sustain neutral perceptions by undermining confidence in everyday usability and long-term ownership viability.

The survey also offers evidence that neutrality and uncertainty coexist with a non-trivial openness to EV purchase in the future, which becomes clearer when attitudes are compared with intention measures (discussed in Section C). For the present subsection, the key empirical point is that undergraduate attitudes are bimodal between positive and neutral, with a relatively small negative segment. This pattern suggests that EVs have not become polarising within the youth cohort but rather the dominant tension is between endorsement of the EV idea and hesitancy about practical feasibility.

Overall, the behavioural findings can be summarised as follows. Undergraduate youth in the sample generally recognise the sustainability and cost advantages of EVs, with environmental friendliness forming the most crucial perceived benefit. At the same time, the leading perceived concerns relate to charging infrastructure and battery lifespan/replacement costs. This combination helps explain why a large share of respondents remain neutral and EVs are perceived as desirable in principle but uncertain in practice (TCLI, 2025).

Adoption Intentions and Key Determinants

Adoption intention is operationalised in the survey as the self-reported likelihood of purchasing an EV in the future. The intention distribution reveals moderate openness combined with substantial hesitation. In the sample, 45.12% of respondents indicated that they would consider purchasing an EV in the future, including 7.93% who were very likely and 37.20% who were likely (TCLI, 2025). Meanwhile, the largest single group was uncertain with 40.85% reported that they were not sure (TCLI, 2025). A smaller share expressed low intention with 10.67% were unlikely and 3.35% were very unlikely (TCLI, 2025). This distribution suggests that future EV adoption among undergraduates is not currently blocked by outright rejection but rather it is shaped by a substantial undecided segment whose intentions may be responsive to changes in price, infrastructure, and technology performance.

A useful way to interpret the intention pattern is to consider it as a market readiness gradient. The “likely/very likely” group reflects a substantial potential demand base, while the large “not sure” group suggests that adoption is conditional on improvements in feasibility and confidence. Importantly, the size of the “not sure” group is comparable to the size of the “likely” group, indicating that Malaysia’s undergraduate youth market may be at a tipping-point stage, the shift in structural enablers could plausibly convert uncertainty into intention. This view is consistent with the earlier finding that nearly half of respondents are neutral in attitude (Section B). Neutrality in attitude appears to map onto uncertainty in intention, producing a large segment that is neither opposed nor committed.

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The survey provides detailed insights into what conditions may shape intention formation by asking respondents to identify important factors in determining their intention to purchase an EV. Here, the results are especially revealing about youth decision-making logic with the highest-rated considerations being not design or social status but rather durability, cost, and service-related criteria. Specifically, durability was selected as important by 84.76% of respondents, making it the top determinant (TCLI, 2025). This was followed by maintenance cost (83.23%) and after-sales service (82.32%) (TCLI, 2025). Features were also widely valued (78.96%), while price was identified as important by 69.82% (TCLI, 2025). By contrast, shape/design (aesthetic appeal) ranked lowest, though still considered important by a majority (59.15%) (TCLI, 2025). This ordering suggests that undergraduate youth assess EVs through a pragmatic, risk-minimising lens, prioritising long-term reliability and ownership support rather than purely symbolic or aesthetic attributes. This interpretation is grounded in the survey's importance rankings: durability (84.76%), maintenance cost (83.23%), and after-sales service (82.32%) were selected more frequently than price (78.96%), features (69.82%) and design (59.15%). The dominance of post-purchase reliability and support criteria indicates a long-term risk management orientation typical of durable-good decisions under uncertainty, where buyers seek to reduce lifecycle risk rather than optimise symbolic or aesthetic attributes. The "durability-maintenance-service" triad at the top of the determinant list also relates directly to the earlier finding that battery lifespan and replacement cost constitute a major concern (Section B). In effect, durability and after-sales service can be interpreted as proxies for trust with respondents appearing to value assurances that the EV will remain functional and affordable over time, and that breakdowns or battery issues can be resolved through reliable service ecosystems. In a market where direct ownership exposure is limited (only 7.93% with household ownership), such priorities are consistent with a risk-averse orientation and without extensive personal experience, consumers may be more sensitive to the perceived downside of a high-cost, technologically novel purchase (TCLI, 2025).

Beyond general determinants, the survey includes explicit measures of affordability thresholds. Respondents were asked about the maximum acceptable price range for an EV. The most preferred category was RM80,000-RM120,000, selected by 41.46% of respondents (TCLI, 2025). A further 18.29% reported that they would only accept prices below RM80,000 (TCLI, 2025). At higher price ranges, acceptance declines: 25.30% selected RM120,000-RM160,000, 11.28% selected RM160,000-RM200,000, and only 3.66% selected above RM200,000 (TCLI, 2025). The resulting pattern suggests a strong affordability ceiling around RM120,000 for much of the sample. Although a non-trivial share is willing to consider EVs in the RM120,000-RM160,000 range, the steep drop beyond RM120,000 indicates that pricing remains a decisive constraint for youth adoption readiness.

This price distribution also provides an important interpretive anchor for understanding the gap between general positivity toward EVs and lower EV preference (only 14.63% preferring EVs as the next car). It is plausible that many respondents view EVs positively but perceive current EV offerings as priced beyond their acceptable threshold. Given that undergraduates generally possess limited purchasing power and given that many rely on family financing for major purchases, affordability thresholds likely represent not only personal willingness but also an implicit assessment of family feasibility. Thus, the maximum acceptable price can be interpreted as both an economic constraint and a perceived "fair value" benchmark for EV adoption.

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Another key dimension shaping EV intention is driving range expectations, which capture the practical usability of EVs and directly relate to range anxiety and charging availability. Respondents were asked about the driving range on a full charge that they would accept under normal driving conditions. The results indicate relatively low acceptance for ranges at or below 400 km. Specifically, acceptance rates for a range of 200 km (5.79%), 300 km (11.59%), and 400 km (16.77%) together suggest that only 34.15% would accept 400 km or less (TCLI, 2025). Acceptance increases substantially with higher ranges: 23.17% would accept 500 km, and 16.77% would accept 600 km (TCLI, 2025). Additional respondents indicated acceptance for 800 km (9.76%), 1,000 km (5.49%), and 1,200 km (10.67%) (TCLI, 2025). In aggregate, the distribution indicates that many undergraduates perceive longer range as a meaningful threshold for confidence, with 500-600 km emerging as an important comfort zone.

This range pattern can be read as both a performance expectation and an indirect proxy for infrastructure trust. In markets where charging networks are perceived as limited, consumers often require longer range to compensate for uncertainty about charger availability. Thus, strong preference for higher range may reflect not only desire for performance but also desire for buffer capacity against infrastructural inconvenience. This interpretation aligns with the survey's separate measure of charging accessibility, where only 32.01% of respondents indicated that charging facilities were accessible in their area (combining 1.52% "easily accessible" and 30.49% "accessible"), while 49.39% reported charging facilities were "difficult to access" and 18.60% reported "not accessible at all" (TCLI, 2025). The dominance of "difficult to access" suggests that many undergraduates perceive infrastructural readiness as insufficient, which plausibly reinforces both range expectations and uncertainty in purchase intention.

Taken together, the intention and determinant findings present a coherent picture. Undergraduate youth in the sample exhibit moderate openness to EV purchase in the future, but many remain uncertain. Their decision calculus is strongly shaped by durability, maintenance cost, and after-sales service, indicating a pragmatic risk-management approach. Affordability thresholds cluster around RM80,000-RM120,000, suggesting a clear price ceiling. Range expectations are relatively demanding, with higher comfort at 500-600 km, and perceived charging accessibility is limited for most respondents. These results imply that the "not sure" segment may be particularly responsive to improvements in charging infrastructure, clear service guarantees, and price alignment with youth affordability thresholds (TCLI, 2025).

Brand Perceptions and Market Imaginaries

The survey further examines how undergraduates perceive EV brands and what factors shape brand trust. This dimension is especially important in emerging markets where consumers lack extensive direct ownership experience and therefore use brands as foundations for reliability and risk reduction. The results indicate that brand perception among undergraduates is anchored primarily in functional credibility rather than in lifestyle symbolism. When asked about factors that might influence perceptions of an EV brand, reliability was cited by 80.18% of respondents as the single most important factor (TCLI, 2025). This was followed by test drive experience (75.00%), brand reputation (73.78%), and after-sales service (73.48%) (TCLI, 2025). Mid-tier influences included online reviews and social media (66.77%) and advertisements and marketing (42.38%) (TCLI, 2025). Notably, explicitly image-based factors ranked much lower as social status was selected by 38.41%, and trend by 35.06% (TCLI, 2025). This pattern reinforces the broader finding that youth evaluate EV adoption through pragmatic

criteria. Even in brand perception, the emphasis is on reliability and experiential confirmation rather than on trendiness or status signalling.

Brand awareness measures provide additional insight into the EV brand landscape as perceived by Malaysian undergraduates. Tesla has exceptionally high brand recognition at 92.38%, positioning it as the dominant reference point in youth brand awareness (TCLI, 2025). The next most recognised brands include BMW (73.48%) and BYD (72.56%) (TCLI, 2025). Several other brands show moderate awareness, including Mercedes-Benz (62.20%), Porsche (55.79%), and Volvo (53.66%) (TCLI, 2025). Awareness levels for other brands vary considerably across the list, suggesting that the EV brand field is unevenly legible to undergraduates and likely influenced by media prominence, showroom presence, and broader brand recognition beyond EV-specific models.

The survey also asks respondents to identify brands they perceive as reliable, revealing a parallel structure in brand trust. Tesla again leads in perceived reliability at 61.89% (TCLI, 2025). Two premium European brands, Porsche and Mercedes-Benz are next, each at 59.45%, followed by BMW at 58.54% and Volvo at 55.18% (TCLI, 2025). Importantly, BYD registers a strong reliability perception at 54.57%, placing it within the top-tier cluster of trusted brands (TCLI, 2025). This result is significant because it suggests that Chinese EV brands are not merely visible but also increasingly associated with reliability in youth perceptions. While the dataset shows Tesla as the dominant brand in both awareness and trust, the presence of BYD within the top-trusted cluster indicates a more plural trust landscape rather than a single-brand monopoly.

The relationship between brand trust and information channels is also visible in respondents' views on car reviews. While reviews are not the most decisive factor compared to reliability or test drives, they still play a notable role in shaping perceptions. In the survey, 35.98% of respondents reported that car reviews influence their perception of EVs (combining 6.10% "very influenced" and 29.88% "influenced") (TCLI, 2025). A further 44.82% reported being "somewhat influenced," while 13.41% were "not very influential" and 5.79% "not influential at all" (TCLI, 2025). This suggests that most undergraduates occupy an intermediate position where reviews matter, but they do not override more direct or credibility-based cues. In practical terms, reviews appear to function as supportive information rather than as the primary determinant of trust.

Beyond brand evaluations, the survey captures an important "market imaginary" element with respondents' perceptions of which country is currently leading Malaysia's EV industry. Here, the distribution is highly revealing. A majority, 60.98%, identified China as the leading country in Malaysia's EV industry, compared to 19.21% who selected the United States, 11.59% Japan, 7.32% Germany, and 0.91% South Korea (TCLI, 2025). This finding indicates that Malaysian undergraduates perceive China as the central driver of EV innovation and market penetration in Malaysia. Importantly, this is not merely a geopolitical opinion, it is likely connected to the visibility and competitiveness of Chinese EV brands in the Malaysian market, and it may shape expectations about pricing, technology maturity, and brand availability. This pattern is consistent with consumer information-processing research, which suggests that online reviews and eWOM influence product evaluation, yet high-credibility cues, such as perceived reliability, direct experience (e.g., test drives), and service assurances, carry greater weight in high-cost and high-risk purchase contexts ((Hennig-Thurau, Gwinner, Walsh, & Gremler, 2004; (Mayzlin & Chevalier, 2003).

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Analytically, the "China leads" perception functions as a macro-level framing within which brand trust and adoption intentions may develop. If youth perceive China as leading, they may be more attentive to Chinese brands, more open to considering Chinese models as mainstream options, or more likely to treat Chinese EV technology as credible. The strong trust rating for BYD is consistent with this broader perception. At the same time, the continued dominance of Tesla in both awareness and reliability indicates that global brand prestige and local visibility remain powerful. The emerging picture is thus not a simple East-West divide but rather it suggests that undergraduates are constructing a market imaginary in which China is viewed as the system-level leader, while Tesla retains a strong position as the benchmark brand.

Overall, brand perception findings align closely with the broader adoption logic observed in the survey. Reliability (80.18%), test-drive experience (75.00%), brand reputation (73.78%), and after-sales service (73.48%) were prioritised far more frequently than social status (38.41%) and trend (35.06%), reinforcing the interpretation that youth adoption reasoning is grounded primarily in functional credibility rather than symbolic value. Tesla dominates in awareness and trust, but Chinese brands, especially BYD also occupy an increasingly credible position. Moreover, the perception that China leads Malaysia's EV industry suggests that Chinese EVs are not seen as peripheral and they are framed as central to the current and future EV landscape (TCLI, 2025).

Discussion

The findings of this study point to a central puzzle that is increasingly common in emerging EV markets with near-universal awareness that does not automatically translate into strong adoption. Among Malaysian undergraduates, EVs are widely "known" at a conceptual level, yet only a minority express EV preference as their next vehicle choice, and a large share remain uncertain about purchasing one in the future (TCLI, 2025). This divergence underscores a broader lesson in technology diffusion and environmental behaviour research, and awareness is often a necessary but insufficient condition for behavioural commitment, particularly when adoption is costly, infrastructure-dependent, and perceived as risky (Kollmuss & Agyeman, 2002); (Rezvani, Jansson, & Bodin, 2015). In EV adoption, the decision is not simply attitudinal but strongly conditioned by feasibility and perceived risk, which can interrupt or weaken the presumed progression from recognition to favourable evaluation to purchase intention. In the present sample, positive perceptions (45.73%) coexist with a similarly large neutral segment (45.73%) and a substantial "not sure" intention group (40.85%). At the same time, leading concerns relate directly to feasibility and risk, limited charging infrastructure (40.85%) and battery lifespan/replacement cost (35.67%), while 67.99% report charging access as difficult or unavailable. These distributions demonstrate how favourable evaluations are frequently tempered by structural constraints, interrupting any linear progression from awareness to positive attitudes to firm purchase intention.

A key mechanism explaining why "high awareness ≠ high adoption" lies in the study's documented gap between recognition and technological familiarity. The survey indicates that almost all respondents have heard of EVs, but far fewer report meaningful familiarity with EV technology (TCLI, 2025). It matters because unfamiliarity tends to increase reliance on indirect cues and risk intuition, especially in markets where household ownership remains rare. With limited experiential exposure, respondents may be unable to translate general EV narratives into confident judgments about everyday usability, long-term maintenance, and lifecycle cost. The resulting stance is often neutrality or conditional openness with a behavioural position that

acknowledges EV benefits while withholding commitment until uncertainties are resolved. In classic behavioural terms, awareness can raise prominence without raising perceived behavioural control and without perceived control, intention may remain weak even when attitudes are positive (Ajzen, 1991). Similarly, from a technology acceptance perspective, perceived usefulness alone is unlikely to produce intention if perceived ease of use here represented by charging convenience, range sufficiency, and service accessibility remains uncertain (David, 1989).

The empirical profile that emerges from this dataset is best characterised as "rational environmentalism" rather than idealistic green consumerism. Malaysian undergraduates strongly recognise the environmental advantage of EVs, identifying emissions reduction as the leading benefit (TCLI, 2025). However, when it comes to determinants of purchase intention, the most emphasised factors are durability, maintenance cost, and after-sales service while aesthetics and image-based considerations rank lowest (TCLI, 2025). This ordering suggests a pragmatic orientation with respondents not rejecting sustainability goals, but they are evaluating EVs as high-stakes durable goods where downside risk matters. This is consistent with broader EV adoption literature showing that mainstream consumers tend to weigh practical constraints such as cost, charging, reliability, resale outcomes, more heavily than abstract environmental values when deciding whether to purchase (Rezvani, Jansson, & Bodin, 2015). It also aligns with research that differentiates early adopters from prospective mass-market buyers and while early adopters may tolerate inconvenience and uncertainty, prospective adopters often demand stronger assurances of reliability and ecosystem readiness (Axsen, Goldberg, & Bailey, 2016); (Hardman, Shiu, & Wilckens, 2016).

Seen through this lens, rational environmentalism is not a contradiction, it is an adaptive decision logic. This interpretation is consistent with the value action gap literature, which demonstrates that pro-environmental values may not translate into behavioural commitment when perceived costs and constraints remain high (Kollmuss & Agyeman, 2002). It also aligns with the Theory of Planned Behavior, where perceived behavioural control moderates the effect of attitudes on intention (Ajzen, 1991). Undergraduates' pro-environmental evaluation of EVs coexists with heightened sensitivity to system-level vulnerabilities especially battery-related anxieties and charging infrastructure constraints (TCLI, 2025). Such anxieties are not merely psychological when they are anchored in structural realities. The survey indicates that perceived accessibility of charging facilities is limited for many respondents, and charging inadequacy is identified as the most significant concern (TCLI, 2025). In behavioural terms, infrastructure availability strengthens perceived behavioural control and infrastructure scarcity undermines it, producing hesitation even among those who evaluate EVs positively (Ajzen, 1991). In technology acceptance terms, inadequate charging functions as a barrier to perceived ease of use, preventing favourable perceptions of EV usefulness (e.g., environmental benefits, lower running cost) from consolidating into firm behavioural intention (Davis, 1989). The large "not sure" segment in purchase intention measures is therefore interpretable as a contingent demand pool, a group whose intention is likely to rise if the enabling environment becomes more reliable and visible.

The findings further highlight how structural conditions shape youth choice through affordability thresholds and risk management. Respondents exhibit a pronounced price ceiling, with maximum acceptable EV prices clustering around RM80,000-RM120,000 and acceptance declining beyond RM120,000 (TCLI, 2025). This pattern should be interpreted as more than simple frugality. Undergraduates occupy a distinctive economic position often with limited

income and dependence on family financing, meaning that price sensitivity reflects both current constraints and perceived feasibility of near-future purchase. Price thresholds also interact with uncertainty, when an innovation is perceived as risky, consumers demand a price that compensates for uncertainty, or they postpone adoption until costs fall, and reliability is proven. This logic helps explain why a cohort can hold positive attitudes yet remain reluctant to prefer EVs over hybrids. Hybrids may be perceived as a "low-risk compromise," retaining familiar refuelling infrastructure while offering partial cost and environmental advantages. In this sense, youth preference for hybrid vehicles can be read as a rational response to a transitional ecosystem rather than a rejection of electrification per se (TCLI, 2025).

A similar logic applies to driving range expectations. Respondents show relatively low acceptance for ranges at or below 400 km and stronger acceptance for 500-600 km and above (TCLI, 2025). These expectations can be interpreted as a form of risk buffer and longer range compensates for a weak charging network by reducing reliance on public chargers and lowering perceived inconvenience. Prior EV adoption research similarly shows that charging availability and infrastructure reliability shape range anxiety and increase the range required for consumer confidence (Rezvani, Jansson, & Bodin, 2015); (Axsen, Goldberg, & Bailey, 2016). Range expectations therefore operate as a behavioural adaptation to infrastructural uncertainty, reinforcing the argument that adoption intention is conditional on ecosystem readiness. This complements the EV adoption literature which treats range anxiety not merely as a technical problem but as a socio-technical one that emerges from the interaction between mobility routines, charger availability, and trust in the charging experience (Rezvani, Jansson, & Bodin, 2015); (Axsen, Goldberg, & Bailey, 2016). For policy and industry stakeholders, this implies that improving public charging coverage and reliability may reduce the pressure for exceptionally high range expectations, thereby widening the set of acceptable EV models for youth consumers.

The brand perception results add another important layer to the discussion and in contexts of limited direct ownership, brand trust functions as a risk-reduction mechanism. Respondents prioritise reliability, test-drive experience, brand reputation, and after-sales service as key influences on brand perception, while trend and social status play a comparatively minor role (TCLI, 2025). This is consistent with a pragmatic consumer logic where uncertainty about technology longevity persists, brands become proxies for warranty credibility, service competence, and long-term dependability. Tesla's dominance in awareness and perceived reliability suggests that youth trust can be anchored in highly visible global brands yet the strong reliability perception for BYD indicates that at least some Chinese brands have already entered the sphere of credible mainstream options for Malaysian undergraduates (TCLI, 2025). Importantly, the perception that China leads Malaysia's EV industry suggests that youth market imaginaries are not limited to Western innovation narratives. Instead, they recognise China's central role in EV diffusion and market penetration. This perception may shape openness toward Chinese EV brands by framing them as technologically mature and competitively positioned, potentially lowering perceived risk for prospective adopters (TCLI, 2025).

In dialogue with existing literature, this study offers both confirmation and refinement. It confirms the centrality of price, infrastructure, and perceived risk as barriers to EV uptake, echoing the synthesis provided by (Rezvani, Jansson, & Bodin, 2015). It also reinforces the argument that mainstream adoption dynamics differ from early-adopter dynamics; the youth cohort behaves less like pioneers willing to tolerate friction and more like conditional adopters seeking assurance and ecosystem readiness (Axsen, Goldberg, & Bailey, 2016); (Hardman,

Shiu, & Wilckens, 2016). At the same time, the study refines how youth should be conceptualised in EV transitions. Rather than treating youth as inherently more adoption-prone due to environmental concern, the evidence supports a model in which youth combine pro-environmental evaluation with strong feasibility screening, an orientation consistent with environmental "value–action gap" scholarship (Kollmuss & Agyeman, 2002). This suggests that youth environmental concern may be real and salient, but it becomes behaviourally meaningful only when structural barriers are reduced and trustworthy ownership ecosystems are established.

Overall, the discussion points to a key conclusion among Malaysian undergraduates, EV adoption potential is substantial but currently bottlenecked by ecosystem conditions. The large neutral and uncertain segments are not signs of rejection; they are signs of conditionality. Policy and market strategies that expand charging infrastructure, strengthen service ecosystems, clarify battery warranties and lifecycle costs, and align prices with youth affordability thresholds are likely to convert cautious optimism into stronger intention. For the academic literature, the study underscores the importance of breaking down awareness from familiarity and treating intention as context dependent. For Malaysia's EV transition, it suggests that youth may indeed become a driving force but only when the EV system becomes sufficiently reliable, accessible, and economically plausible for first-time buyers.

Conclusion

This study set out to examine awareness, attitudes, and adoption intentions toward electric vehicles (EVs) among Malaysian undergraduate youth, with the broader aim of clarifying how a strategically important cohort evaluates an emerging mobility technology in a transitional market. Drawing on a cross-sectional online survey of 328 undergraduate respondents, the analysis provides an empirically grounded account of youth readiness for EV adoption and the conditions under which intention is likely to translate into future uptake (TCLI, 2025). Overall, the findings suggest that Malaysian undergraduates are neither resistant nor uncritically enthusiastic: only 14.02% report being unlikely or very unlikely to purchase an EV, while 40.85% remain uncertain and only 7.93% report being very likely. Moreover, EV is the preferred next-vehicle type for just 14.63% of respondents.

Three core findings stand out. First, the study identifies a pronounced awareness-familiarity gap. EV recognition is nearly universal in the sample, indicating that EVs have entered mainstream youth discourse. Yet only a minority report meaningful familiarity with EV technology, and household-level ownership remains low (TCLI, 2025). These matters because limited experiential exposure can inhibit confidence and increase reliance on indirect information cues, producing neutrality or conditional openness rather than firm commitment. Second, respondents' attitudinal profile is mixed but not polarised. A substantial proportion hold positive views of EVs, and environmental friendliness is widely recognised as the most salient benefit (TCLI, 2025). At the same time, neutrality remains significant, reflecting ambivalence rooted in practical concerns, especially charging infrastructure limitations and battery lifespan/replacement costs (TCLI, 2025). Third, adoption intention is moderate and highly conditional. Nearly half of respondent's express willingness to consider purchasing an EV in the future, but a similarly large share remains uncertain (TCLI, 2025). The determinants that respondents prioritise durability, maintenance cost, and after-sales service. This underscores that youth decision-making is strongly pragmatic. Affordability thresholds concentrate around RM80,000-RM120,000, and range expectations tend to favour 500-600 km

or above, indicating that perceived ecosystem readiness and risk buffers are central to intention formation (TCLI, 2025). These findings collectively reinforce the argument that positive attitudes alone are insufficient, and intention is shaped by whether the EV ecosystem is perceived as reliable, accessible, and economically plausible for first-time buyers.

In addition to these adoption-oriented results, the study highlights the role of brand perceptions and market imaginaries in an emerging EV environment. Respondents' trust in EV brands is anchored primarily in reliability, test-drive experience, brand reputation, and after-sales service, while trend and social status are relatively less influential (TCLI, 2025). Tesla dominates in awareness and perceived reliability, but certain Chinese brands particularly BYD also register strong trust signals, and a majority of respondents perceive China as leading Malaysia's EV industry (TCLI, 2025). This suggests that undergraduate youth are constructing a market understanding in which functional credibility and ecosystem support matter more than symbolic consumption, and in which China is recognised as a central actor in the EV landscape. Taken together, the results depict Malaysian undergraduates as rational environmentalists as they endorse the sustainability promise of EVs while applying stringent feasibility screening and risk management in prospective purchase decisions.

Several limitations should be acknowledged. First, the study relied on an online, non-probability convenience sample, which limits statistical generalisability. The findings should therefore be interpreted as indicative patterns among the achieved sample rather than definitive population estimates of Malaysian undergraduates. Second, the study is cross-sectional and captures perceptions at one point in time. However, EV markets evolve rapidly, and attitudes and intentions may shift as infrastructure expands, prices change, and new models enter the market. Third, the analysis is primarily descriptive and exploratory, focusing on mapping distributions and identifying conditionalities rather than estimating causal relationships. Future research may apply inferential modelling to test the relative predictive power of affordability, infrastructure access, and trust variables while controlling for socio-demographic factors. Fourth, as with most survey-based research on emerging technologies, self-reported intentions may not translate directly into behaviour, especially when actual purchasing decisions depend on family resources, broader economic conditions, and the availability of suitable vehicle options.

Despite these limitations, the study offers several academic contributions. Empirically, it provides Malaysia-specific evidence on an understudied cohort, the undergraduate youth that is likely to influence medium-term EV demand as they transition into the workforce and purchasing age. Conceptually, it supports a constraint-sensitive interpretation of EV readiness by distinguishing between surface awareness and deeper familiarity and by showing how neutrality and uncertainty can coexist with positive sustainability evaluation. Analytically, the results underscore the value of examining adoption intention as a conditional outcome shaped by structural enablers (charging access, price thresholds) and risk-reduction mechanisms (brand trust and service ecosystems), rather than treating intention as a straightforward extension of pro-environmental attitudes. In this sense, the study strengthens the case for integrating behavioural adoption models with socio-technical transition conditions when analysing EV diffusion in emerging markets.

Future research can extend this study in at least four directions. First, researchers may employ probability-based sampling or stratified designs to improve representativeness across regions, institutions, and socio-economic backgrounds, enabling stronger population inferences.

Second, longitudinal designs would be valuable for tracking whether and how the uncertain segment shifts as Malaysia's charging infrastructure expands, EV prices evolve, and policy incentives change. Third, mixed-method approaches that combine surveys with interviews or focus groups could illuminate how undergraduates interpret risk, evaluate battery durability and service credibility, and negotiate family involvement in purchasing decisions. Fourth, comparative research could place Malaysia in a broader Southeast Asian context, examining whether similar patterns of rational environmentalism and conditional adoption emerge in neighbouring markets with different policy regimes and infrastructure trajectories. Such extensions would not only refine understanding of youth EV adoption but also contribute to broader debates on how sustainable mobility transitions unfold in middle-income, rapidly changing consumer environments.

In conclusion, Malaysian undergraduate youth demonstrate substantial awareness and a generally positive orientation toward EVs, yet adoption readiness remains shaped by affordability constraints, infrastructure uncertainty, and the need for credible reliability assurance. The evidence suggests that youth may become a significant driver of Malaysia's EV transition, but the pace of that transition will depend on the extent to which market offerings and policy interventions can convert cautious optimism into confident intention and, ultimately, adoption.

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