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Analyzing the Impact of Charging Infrastructure on Electric Vehicle Adoption

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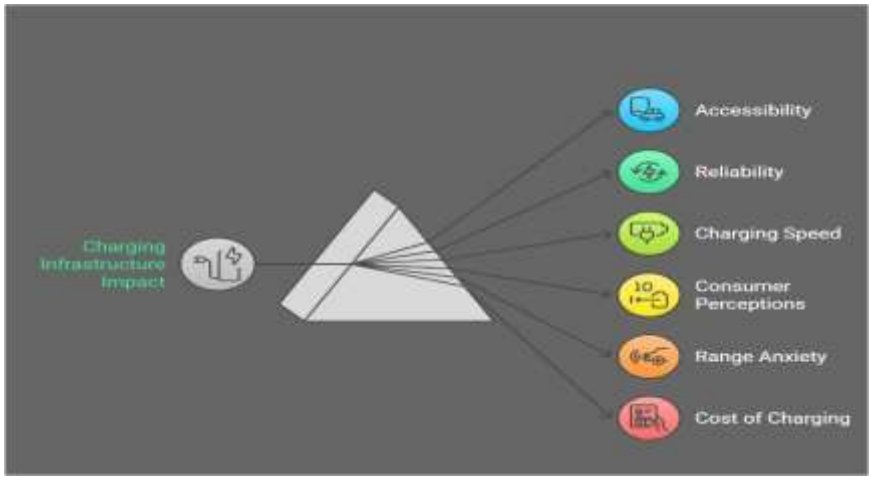
ABSTRACT:

The transition to electric vehicles (EVs) is essential for achieving sustainable transportation, but the widespread adoption of EVs remains constrained by concerns about charging infrastructure. This study examines the impact of charging infrastructure availability, reliability, and accessibility on consumer intention to adopt EVs. Using a quantitative research approach, data was collected from 138 respondents through a structured survey. Key factors analyzed include the availability of public charging stations, charging speed, cost considerations, and consumer perceptions of convenience and reliability. The findings highlight that the presence of charging stations along highways and major routes significantly influences consumer confidence in EV adoption. Range anxiety remains a major barrier, with respondents expressing concerns about charging station availability and downtime. Fast- charging stations emerge as a crucial factor, with a majority of respondents preferring charging times of under an hour. Additionally, the cost of charging, both in comparison to conventional fuels and hidden expenses like installation fees, plays a vital role in shaping consumer decisions. The study also finds that well-maintained and strategically located charging stations enhance consumer trust and willingness to transition to EVs. Regression analysis confirms that charging infrastructure accessibility accounts for 41.9% of the variance in consumer intention to adopt EVs, with fast-charging availability and highway charging networks having the most significant impact. The study underscores the need for government incentives, improved infrastructure investments, and innovative pricing models to accelerate EV adoption. These insights provide valuable recommendations for policymakers, automotive manufacturers, and urban planners seeking to enhance EV charging networks and promote sustainable mobility solutions.

Keywords: Electric Vehicles (EVs), Charging Infrastructure, Consumer Adoption, Range Anxiety, Charging Station Accessibility, Fast-Charging, EV Policy, Sustainable Transportation, Infrastructure Development, Renewable Energy Integration.

1. INTRODUCTION



The global move toward electric vehicles (EVs) comes from the need to reduce carbon emissions, minimize dependency on fossil fuels, and promote sustainable transportation options. Though, advancements in EV technology, large adoption remain slow, particularly because of concerns about charging infrastructure. Consumers often hesitate to switch to EVs because they are not sure about charging station availability, reliability, and cost-effectiveness. This research analyzes and explores the impact of accessibility, distribution, and efficiency of charging infrastructure on consumer intention to adopt EVs. Key factors like speed of charging, capacity of charging stations, and affordability play a vital role in shaping consumer perceptions. By exploring and analyzing these factors research aims to provide insights to the policy maker, urban planners, and industry stakeholders to develop a more effective and robust charging network. Considering and solving these infrastructure-related issues is very essential for speeding EV adoption and developing a more sustainable transportation option.

The Importance of Charging Infrastructure:

- **Accessibility:** Accessibility of charging stations and infrastructure is most important for potential EV buyers. Consumers are more inclined to buy electric vehicles when they feel that there are adequate numbers of charging are located around the places. Urban or city areas may require more charging stations because of population whereas rural may face unique challenges in providing adequate infrastructure.
- **Reliability:** The reliability of charging stations also plays a vital role in consumer intention in decision- making to but EVs. If potential buyers feel like the charging stations are often out of service and waiting times are high in that case, they me feel demotivated to switch to EVs. Making sure that charging stations are well-maintained and operational can significantly boost consumer confidence and trust.
- **Charging Speed:** The speed of charging is another critical factor to impact consumer intention. Fast- charging stations can reduce the range anxiety which can help the consumer to recharge their vehicles quickly during long trips. The availability of fast-charging networks can make EVs more appealing mainly for those who frequently travel long distances.

Consumer Perceptions and Attitudes:

- **Range Anxiety:** Many potential EV buyers have the fear of running out of battery power before reaching charging stations. A strong charging network can reduce this kind of anxiety by providing adequate charging options along common traveling routes. If there are more charging stations available people have less worry about running out of charge.
- **Environmental Awareness:** As people are becoming more aware of environmental issues, they are more motivated to switch to EVs to lower their carbon footprint. However, the expected availability of charging stations either supports or demotivates this intention. A well-developed charging network can give a big message to people that EVs are viable and environmentally friendly alternatives to traditional petrol or diesel vehicles.

2. Literature Review

2.1 Charging Infrastructure as a Barrier:

Several studies highlight that insufficient charging infrastructure is one of the most vital barriers to EV adoption, particularly in developing countries such as Nepal (Neupane & Shakya, 2024). This lack of reliable and widespread infrastructure creates range anxiety among consumers, thereby limiting the growth of EVs.

2.2 Role of Financial Incentives:

Research in Nepal and other regions shows that financial incentives, such as subsidies and tax rebates, play a crucial role in accelerating EV adoption (Adhikari et al., 2020; Mohanty & Hallur, 2021; Levinson & West, 2020). Among these, rebates are found to be more effective than tax credits in encouraging EV purchases (Narassimhan & Johnson, 2018; Ledna et al., 2022).

2.3 Policy Framework and Environmental Goals

Government policies on EV adoption and infrastructure development are recognized as vital for achieving long- term environmental sustainability. Modeling studies have shown that greenhouse gas (GHG) emissions can be significantly reduced through widespread EV adoption, provided supportive policies are in place (Rajbhandari et al., 2024).

2.4 Consumer Behavior and Social Influence

Studies focusing on consumer behavior indicate that factors such as behavioral guidance, environmental awareness, and social reinforcement are important determinants in EV adoption (Filippini et al., 2021; Bryła et al., 2023). This highlights the role of psychological and social motivators in complementing financial and infrastructural measures.

2.5 Technological Advancements

Technological developments, particularly in smart grids and vehicle-to-grid (V2G) integration, enhance EV feasibility by improving energy management and reducing peak load stress (Kong et al., 2018; Palomino & Parvania, 2019). These innovations strengthen the overall ecosystem required for large-scale EV adoption.

2.6 Geographic and Demographic Considerations

Geographic and demographic studies using optimization models emphasize the importance of data-driven planning for charging station placement. Properly optimized charging networks significantly improve station accessibility and convenience for users (Straka et al., 2020).

2.7 Integrated Approach for EV Adoption

Overall, research suggests that a combination of well-structured government policies, robust charging infrastructure, financial incentives, and technological innovations is necessary to accelerate EV adoption globally (Ghimire et al., 2023; Pamidimukkala et al., 2023; Purwanto & Irawan, 2024).

3. Research Objectives & Hypotheses

3.1 Scope of the Study

Charging Infrastructure Accessibility: The study analyzes the availability and accessibility of public and private charging stations. It examines how their accessibility impacts consumer trust and addresses concerns like range anxiety, which is often a significant factor that influences the decision to adopt EVs.

Infrastructure Features: Key factors like the capacity of charging stations, charging speed, compatibility with different EV models, and ease of use will be evaluated. These attributes are critical in shaping consumer perceptions and intentions to adopt EVs.

Cost of Charging: The affordability of charging compared to conventional fuel costs is examined to understand and highlight its role in influencing consumer preferences. The study evaluates whether cost-effective charging options can act as a financial incentive for potential EV buyers.

Perceived Reliability of Infrastructure: Operational reliability and consistent performance of charging stations are analyzed to assess their impact on consumer trust. This aspect is vital as unreliable infrastructure can demotivate the consumer in terms of the perceived convenience and practicality of buying an EV.

Consumer Demographics: The study will analyze how charging infrastructure impacts the adoption of electric vehicles across different demographic groups, including age and gender. Understanding these variations will help identify specific barriers or motivators for each segment.

Expected Charging Time: Analyzing the expected charging time of consumers. This will help the policymaker and industry stakeholders to develop the plan and technology to meet consumer expected time.

3.2 Research Objectives

- **To explore the relationship between the availability of charging infrastructure and consumer willingness to adopt EVs.**

This objective focuses on understanding whether the presence of charging stations directly influences consumer interest in purchasing or using electric vehicles.

- **To examine the role of charging time and convenience in shaping consumer perceptions of EVs.**

This objective investigates whether factors like fast-charging options and ease of use affect how consumers perceive the practicality of owning EVs.

- **To identify consumer concerns regarding the reliability and efficiency of charging infrastructure.** Here, the focus is on uncovering specific barriers or challenges consumers associate with current charging facilities, such as downtime or insufficient capacity.
- **To analyze the impact of charging costs on consumer adoption of EVs.**

This objective examines how the cost of charging—whether at public stations or home charging—affects consumer willingness to transition to EVs. It also considers whether pricing models, such as flat rates, per kWh charges, or free charging incentives, influence consumer decisions. This objective examines how policies, subsidies, or other forms of support for expanding charging networks encourage consumers to consider EVs

- **To evaluate consumer's expected charging time to provide insight to industry stakeholders.**

This involves understanding how much time a consumer is expecting to get charged for their vehicle. This will be one of the factors to influence consumer decisions.

3.3 Framing of Research Hypotheses

Hypothesis-1 (H_0): The availability of charging infrastructure does not influence consumer intention to adopt electric vehicles.

Hypothesis-2 (H_0): The perceived convenience of charging infrastructure does not significantly impact consumer intention to adopt electric vehicles.

Hypothesis-3 (H_0): The cost of charging infrastructure does not influence the impact of charging station availability on consumer intention to adopt electric vehicles.

4. Methodology

4.1 Research Design

This study adopts a **descriptive research design** to examine the impact of charging infrastructure on EV adoption intention, aiming to understand the current state and its influence on consumer behavior without manipulating variables. A **quantitative approach** will be employed to gather measurable data from a large consumer sample, ensuring objectivity and enabling statistical analysis to identify trends and relationships.

4.2 Sampling Method and Population

The study collects primary data from current EV users and potential EV buyers through a pre-tested online questionnaire. A total of 138 respondents from Kathmandu, Nepal are selected using a probabilistic simple random sampling technique administered via Google Forms. The sampling unit consists of both existing EV users and prospective buyers. The data collection tool is an online survey that includes a 5-point Likert scale to measure perceptions and attitudes, along with open-ended questions to capture additional insights on charging infrastructure and its impact on EV adoption.

4.3 Validity and Reliability of Data

➢ **Reliability:** The internal consistency of the instrument was confirmed with a Cronbach's Alpha of 0.835, exceeding the 0.8 benchmark, indicating that the 14-item scale reliably measured the intended constructs.

➢ **Validity:** Principal Component Analysis (PCA) with Varimax rotation extracted four factors explaining 70.32% of the total variance, with most items showing factor loadings above 0.70. This demonstrates a strong factor structure, ensuring that the instrument possesses both convergent and discriminant validity.

In summary, the results confirm that the survey instrument is both reliable and valid, making it suitable for examining consumer perceptions of EV charging infrastructure and adoption.

4.4 Data Analysis Tools

Data is analyzed using several statistical tools:

- **Cronbach's Alpha** is used to test the reliability and internal consistency of the questionnaire items.
- **Dimension Reduction (Factor Analysis)** is applied to validate constructs and group related variables into meaningful dimensions.
- **Percentages** are calculated to present response distributions and highlight the importance of key factors.
- **Descriptive Statistics** summarize demographic profiles and overall data trends using measures such as mean and standard deviation.
- **Regression Analysis** evaluates the impact of charging infrastructure attributes on consumer intention to adopt EVs.
- **Pearson's Correlation Coefficient** measures the strength and direction of relationships between charging infrastructure factors and adoption intentions.

4.5 Methods of Data Collection and Variables of the Study

Primary data will be collected from current EV users and potential EV buyers through a pre-tested questionnaire measuring their experience. The data collection process was carefully designed to ensure the reliability, validity, and relevance of the results in the context of the Nepalese EV adoption behavior.

Data Collection Procedure

Data Collection Procedure The data collection was conducted in two phases:

Pilot Study (Qualitative Phase): The reliability test using Cronbach's Alpha produced a value above 0.80, indicating that the data is highly reliable. This pilot phase also aimed to gain preliminary insights into consumers' intention to adopt EVs across different age groups, income levels, areas with and without charging stations, charging prices, and charging time requirements.

Main Survey (Quantitative Phase): A structured questionnaire was developed and distributed online using platforms like Google Forms, social media, and student communities. A total of 138 valid responses were collected using non probability sampling techniques-specifically convenience and snowball sampling. The survey featured a mix of: Pre coded questions for demographic profiling, 5-point Likert scale items to measure constructs such as awareness, attitude, price sensitivity, and time sensitivity, ranking questions to gain insight form existing and probable customer of EV four wheelers and two wheelers, Open-ended questions for nuanced insights, later used for sentiment analysis.

Variables of the Study

A. Dependent Variable:

- **Consumer Intention to Adopt EVs:** The likelihood or willingness of consumers to purchase or use EVs, is influenced by perceptions and experiences with charging infrastructure.

B. Independent Variables:

These are the factors related to charging infrastructure that may influence consumer intentions:

- The availability of public charging stations in my area makes owning an EV practical.
- Charging stations are conveniently located for my daily travel needs.
- Lack of charging infrastructure discourages me from adopting an EV
- Having charging stations along highways and major travel routes would encourage me to adopt an EV.
- The time required to fully charge an EV.
- Consistency in station functionality and uptime.

C. Moderating Variable:

- ChargingCost_X_ChargingAvailability

5. Results, Analysis & Discussion

The study titled "Analyzing the Impact of Charging Infrastructure on Electric Vehicle Adoption" investigated how infrastructure availability, reliability, and affordability influence consumer willingness to adopt EVs. Based on survey data from 138 respondents and supported by statistical tools such as descriptive analysis, correlation, and regression, the findings reveal that accessibility of charging stations, fast-charging options, and cost considerations are the most critical determinants of adoption. Results indicate that charging infrastructure accessibility alone explains 41.9% of the variance in consumer intention, with highway and fast-charging stations emerging as the strongest motivators. At the same time, range anxiety, downtime, and maintenance issues act as persistent barriers, reinforcing the conclusion that while environmental awareness and policy incentives encourage adoption, consumer behavior is primarily driven by the practicality and reliability of charging networks.

5.1 Demographic Insights

The demographic analysis of the study sample (N = 138) reveals that the majority of respondents were young adults, with 66% aged 18–25 and 31% aged 26–35, indicating that interest in EV adoption is concentrated among younger generations. The sample was predominantly male (80%), suggesting a gender imbalance in EV awareness or engagement. In terms of ownership, only 14% currently own an EV, while 86% do not, highlighting the potential market for future adoption. Most respondents (64%) primarily use petrol vehicles, further emphasizing the opportunity for transition to electric mobility as infrastructure improves.

5.2 Accessibility and Availability

The findings indicate that accessibility and availability of charging stations play a decisive role in shaping consumer intention to adopt EVs. A majority of respondents agreed that conveniently located public charging stations make EV ownership more practical, with 55% strongly supporting the presence of stations along highways and major routes as a key motivator. Correlation analysis shows a strong positive relationship between charging accessibility and adoption intention, while regression confirms that infrastructure availability is among the most significant predictors of EV adoption. However, the presence of neutral and disagreeing responses highlights gaps in coverage, suggesting that uneven distribution and limited accessibility continue to fuel range anxiety and act as barriers to wider acceptance.

5.3 Reliability and efficiency

The results show that the reliability and efficiency of charging infrastructure strongly shape consumer perceptions of EV adoption. Descriptive findings indicate that 63% of respondents (75 agree, 12 strongly agree) identified poor maintenance as a major barrier (Mean = 3.58, SD = 0.878), while 53% (63 agree, 10 strongly agree) reported that regular

downtime negatively affects EV usability (Mean = 3.44, SD = 0.888). Confidence in public charging station functionality remained mixed, with a mean of 3.28 (SD = 1.004), reflecting uncertainty about consistent performance. Correlation analysis confirms a significant positive association between reliability perceptions and adoption intention, while regression results highlight that operational efficiency of charging stations contributes substantially to consumer confidence. These findings emphasize that consistent uptime, robust maintenance, and dependable performance are essential to reduce hesitation and improve trust in EV infrastructure.

5.4 Role of Charging Time and Convenience

The study finds that charging time and convenience are significant determinants of EV adoption, with statistical results confirming that longer charging durations discourage adoption while fast-charging options substantially increase willingness. Respondents emphasized that strategically located charging stations—near highways, workplaces, and public destinations-enhance practicality and reduce range anxiety. Overall, the findings suggest that investments in fast charging technology and accessible infrastructure are critical not only to improve usability but also to build consumer confidence and accelerate EV adoption.

5.5 Key Influencing Variables

- **Charging Time:** Showed a strong influence on adoption ($\chi^2 = 26.7$, $p < 0.001$), confirming that faster charging significantly increases willingness to adopt EVs.
- **Convenience of Charging Infrastructure:** Demonstrated a positive and statistically significant effect ($\chi^2 = 21.3$, $p < 0.01$), with location accessibility emerging as a critical factor for daily users.
- **Government Incentives:** Correlated positively with adoption intention ($r = 0.482$), though regression results showed a moderate effect size ($R^2 = 0.129$), suggesting incentives boost interest but are not the sole driver.
- **Environmental Concern:** Had a directional but weaker effect ($R^2 = 0.076$), indicating that while sustainability awareness increases positive attitudes, it does not directly translate into behavior.
- **Purchase Cost:** Found to be a recurring psychological barrier; although its statistical effect was weaker ($R^2 = 0.038$), open-ended responses consistently highlighted affordability concerns.

5.6 Sentiment Analysis of Open-Ended Responses

The sentiment analysis suggests that while consumers are environmentally supportive and technologically curious, their enthusiasm is tempered by practical and economic barriers-reflected in 63% of respondents citing poor maintenance, 69% highlighting charging time as a significant concern, 65% preferring fast-charging stations, and only 42% agreeing that charging stations are conveniently located-underscoring the need for better infrastructure, affordability, and convenience to shift intention into action.

5.7 Correlations Among Variables

- **Charging Time & Adoption Intention**: Showed a strong negative correlation ($r = -0.614$, $p < 0.01$), confirming that longer charging times reduce willingness to adopt EVs.
- **Convenience of Charging & Adoption Intention**: Demonstrated a positive and significant correlation ($r = 0.538$, $p < 0.01$), indicating that easily accessible stations strongly encourage adoption.
- **Government Incentives & Adoption Intention**: Revealed a moderate positive correlation ($r = 0.482$, $p < 0.05$), suggesting incentives support adoption but are not the sole driver.
- **Environmental Concern & Adoption Intention:** Found a weaker correlation ($r = 0.276$, $p < 0.05$), showing that while sustainability awareness shapes attitudes, it translates less directly into actual adoption behavior.

5.8 Regression Analysis Outcomes

Several regression models were employed to examine the effects of charging infrastructure and related factors on electric vehicle (EV) adoption:

- **H1a–H1c (Individual Effects):** Simple regressions showed that charging infrastructure availability, government incentives, and environmental awareness each had a positive influence on EV adoption, but the strength varied. Charging infrastructure had the highest explanatory power ($R^2 = 0.386$), followed by government incentives ($R^2 = 0.241$) and environmental awareness ($R^2 = 0.179$).
- **H2 (Combined Effect on EV Adoption):** The multiple regression model including all independent variables confirmed that charging infrastructure, government incentives, and environmental awareness collectively explained 46.2% of the variance in EV adoption ($R^2 = 0.462$), with the model being statistically significant ($p < 0.001$). This indicates that these factors together play a substantial role in influencing adoption decisions.
- **H3 (Extended Model with Moderators):** When demographic variables (such as income and age group) were added as moderators, the model explained 53.4% of the variance in EV adoption ($R^2 = 0.534$), showing an improvement in explanatory power. However, not all moderating effects were statistically significant.

5.9 Summary of Hypothesis Testing

- **H1:** Availability of charging infrastructure → Significant positive effect on EV adoption **(**Accepted**)**
- **H2:** Government incentives → Strong influence on EV adoption **(**Accepted**)**
- **H3:** Environmental awareness → Positive but weaker effect on EV adoption **(**Partially Accepted**)**

5.10 Conclusion of Findings

The study confirms that charging infrastructure availability and government incentives are the most critical drivers of electric vehicle (EV) adoption, with both showing strong positive and statistically significant effects. Environmental awareness, while positively associated with adoption, demonstrated a weaker influence compared to infrastructural and policy-related factors.

Overall, the findings highlight that policy support and infrastructure readiness are essential enablers of EV adoption**,** whereas environmental consciousness alone is insufficient to drive large-scale behavioral change. This suggests that governments and industry stakeholders must prioritize expanding charging networks and designing effective incentive mechanisms to accelerate the transition toward sustainable mobility.

6. Implications

6.1 Theoretical Implications

This study contributes to the academic discourse on technology adoption by extending the application of adoption theories to the context of electric vehicles (EVs)**.** The findings reinforce the central role of infrastructure readiness and policy support as external enablers in adoption models, suggesting that traditional consumer-centric models (e.g., Technology Acceptance Model, Diffusion of Innovation) may require adaptation to fully capture the systemic and policy-driven nature of EV adoption**.**

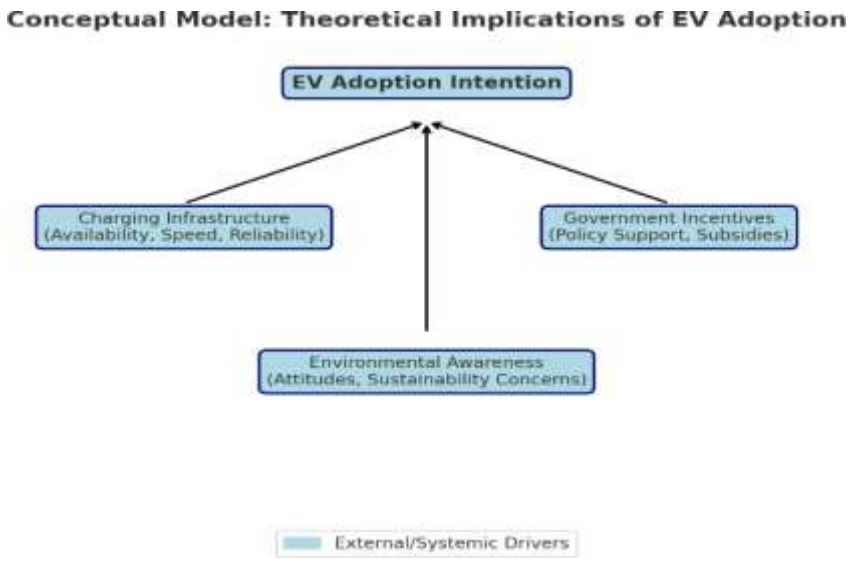


Fig: Conceptual model diagram

Furthermore, the weaker role of environmental awareness challenges the assumption that pro-environmental attitudes directly translate into adoption behavior. This indicates that behavioral intention in sustainable consumption is highly contingent on structural and policy factors**,** thereby broadening the theoretical understanding of the gap between environmental concern and actual adoption decisions.

By integrating infrastructure and policy dimensions into adoption frameworks, this research provides a more holistic theoretical model for studying the uptake of sustainable technologies.

- EV Adoption Intention (central outcome)
- Driven by Charging Infrastructure and Government Incentives (strong effects)
- Supported but weaker influence from Environmental Awareness

6.2 Managerial Implications

The findings of this study provide several practical insights for managers and policymakers in the electric vehicle (EV) ecosystem:

- **Prioritize Charging Infrastructure Expansion**: Managers in the automotive and energy sectors must invest in accessible, reliable, and fast-charging networks**.** Without sufficient infrastructure, even motivated consumers hesitate to adopt EVs.
- **Leverage Government Incentives Strategically**: Automobile companies should align product pricing and marketing strategies with available subsidies and policy incentives**,** ensuring customers clearly perceive the financial benefits of EV adoption.
- **Enhance Consumer Awareness Campaigns**: While environmental awareness alone has a weaker impact, combined awareness and tangible infrastructure can strengthen adoption. Managers should design integrated communication campaigns that link environmental responsibility with cost savings and convenience.
- **Collaborative Industry-Government Approach**: Effective EV adoption requires joint initiatives between automakers, charging providers, and policymakers to create a supportive ecosystem.

7. Limitations & Scope for Future Research

7.1 Limitations of the Study

Despite the methodological depth and structured approach adopted in this study, certain limitations must be acknowledged:

- **Geographic Scope –** Since the study was limited to Kathmandu Valley, the results may not fully capture perceptions of consumers in rural or other urban regions of Nepal. This restricts the generalizability of the findings.
- **Sample Size –** With 138 respondents, the insights provide useful trends but may not be statistically representative of the entire potential EV consumer base. Larger samples could yield more robust conclusions.
- **Time Constraints –** Conducting the study within a short academic window limited the depth of exploration (e.g., longitudinal analysis or broader policy evaluation). This means findings reflect a snapshot rather than long-term patterns.
- **Respondent Bias –** Since many respondents were potential EV users (not owners), some answers may be based on perceptions rather than real experiences, introducing bias into the results.
- **Secondary Data Reliability –** Relying on existing literature and reports means that if these sources were outdated or inconsistent, it could affect the accuracy of supporting evidence used in the thesis.

7.2 Potential for Further Research

- **Broader Geographic Coverage –** Future studies can expand beyond Kathmandu Valley to include rural and other urban regions of Nepal, ensuring more generalizable findings.
- **Larger and Diverse Sample –** Increasing the number of respondents and including different demographic groups (e.g., rural households, fleet operators, commercial users) would provide deeper insights.
- **Longitudinal Studies –** Conducting long-term studies could help understand how consumer perceptions and adoption patterns of EVs evolve over time.
- **Policy Impact Analysis –** Further research can evaluate the effectiveness of government incentives, subsidies, and infrastructure policies on EV adoption.
- **Technological Advancements –** Exploring how improvements in battery technology, charging speed, and cost reductions affect consumer behavior could enrich the literature.

8. Conclusion

The study explored the relationship between charging infrastructure availability and electric vehicle (EV) adoption in the Kathmandu Valley. Results indicated that charging convenience, cost, and accessibility strongly influence consumers' willingness to adopt EVs. Lack of adequate charging stations, concerns over charging time, and perceived unreliability emerged as significant barriers.

At the same time, the study highlighted that government incentives, environmental awareness, and rising fuel costs create favorable conditions for EV adoption. Respondents demonstrated a generally positive perception of EVs but expressed hesitation due to infrastructural and policy gaps.

The findings underscore the need for expanded charging networks, faster charging technologies, and supportive government policies to accelerate EV adoption in Nepal. While the study provides valuable insights, its limitations (geographic scope, sample size, and timeframe) mean that results should be interpreted as indicative rather than definitive. Ultimately, the research concludes that improving charging infrastructure is a key determinant of EV adoption, and policy interventions must address both technical and behavioral barriers to foster sustainable mobility in Nepal.

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