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# "Does Demographic factors influence the Continuance Usage Intention of Electric Car Users?"

Mrs. N. Gayathri[1], Research Scholar, Assistant Professor, Department of Commerce,
Sri Ramakrishna College of Arts & Science for Women, Coimbatore.
Dr. K. Chitra[2], Principal & Research Supervisor, Sri Ramakrishna College of Arts & Science for Women, Coimbatore.

**Abstract:**
With growing environmental concerns and various policies promoting sustainable transportation in India, the concept of EV adoption is increasing. However, the continuance usage intention of EV cars mainly depends upon the after adoption remain critical for long-term usage. The research investigates how perceived challenge includes technical, infrastructural, economic, psychological, and policy-related factors affect user satisfaction and their intention to continue using EV cars. The study conducted using purposive sampling method, and 122 valid responses from EV users were analysed using descriptive statistics and PLS-SEM. The findings reveal that perceived challenges have a significant negative impact on user satisfaction, highlighting persistent barriers such as charging infrastructure limitations and battery concerns. Surprisingly, satisfaction shows only a weak influence on continuance intention, indicating that continued usage decisions are shaped by additional external and demographic factors. Age significantly moderates the relationship between challenges and satisfaction, while income does not show a notable moderating effect. The study emphasizes the need for policymakers and industry stakeholders to address practical barriers and design user-centric strategies tailored to different demographic groups. Overall, the research contributes to understand post-adoption behaviour and provides insights for enhancing sustainable EV usage.

***Keywords: Electric cars, Satisfaction, Perceived Challenges, Continuance Intention.***

## 1. Introduction:

Modern transportation industry across the globe is undergoing a major transition due to changing environmental concerns, rapid technological advancements, government policies and subsidies promoting sustainable mode of vehicles. Conventional internal combustion engine vehicles are major contributors to greenhouse gas emissions and air pollution, leading to increased emphasis on cleaner alternatives such as electric vehicles. Countries like India are actively promoting EV adoption through policy initiatives such as the FAME India Scheme, aiming to reduce carbon emissions and dependence on fossil fuels. Electric vehicle adoption behaviour is influenced by multiple psychological, social, economic, and infrastructural factors. Theoretical frameworks such as the Theory of Planned Behaviour (TPB) suggest that attitude, subjective norms, and perceived behavioural control significantly shape individuals' intentions and actual behaviour toward adopting innovative technologies. In addition, environmental concern, lifestyle orientation, awareness of green initiatives, and perceived benefits such as cost savings and environmental protection play a vital role in influencing EV ado2ption. Despite increasing awareness and government support, several challenges hinder large-scale adoption. These include high initial purchase cost, limited charging infrastructure, battery performance concerns, range anxiety, and lack of technical knowledge. Understanding these challenges is essential not only to promote adoption but also to evaluate the satisfaction level among existing adopters. Satisfaction influences word-of-mouth promotion, repeat purchase intention, and long-term sustainability of EV markets.

## 2. Review of Literature:

Nikola Manev (2025) et al., in their study "Electric Vehicle Adoption in Poland: Insights from Academia and Technically Educated Youth" examined the factors influencing powertrain technology choice and the barriers to electric vehicle (EV) adoption in Poland, focusing on insights from technically educated youth, early-career researchers, and academic professionals. Drawing on a mixed-methods approach, the study investigates public perceptions, motivations, and challenges associated with EV uptake in a country historically reliant on fossil fuels. Key drivers such as environmental considerations, government policies, and infrastructure development are evaluated alongside persistent obstacles, including high initial purchase costs, inadequate charging networks, range anxiety, and scepticism about battery performance. This study, though limited by sample size and demographic focus, offers valuable contributions to understanding the early-stage adoption of EVs in Poland and serves as a foundation for future research targeting a more diverse population. The applied research model is scalable, providing a framework for broader studies that could include different age groups, geographical regions, and professional sectors.

Prajapati Meet (2025) et al., in the work, "A Comparative Study on Consumer Satisfaction Regarding EV vs Petrol Vehicle Owners in Ahmedabad City" explores consumer satisfaction regarding electric vehicles (EVs) and petrol vehicles in Ahmedabad, India, focusing on key factors such as performance, fuel efficiency, maintenance costs, environmental concerns, and infrastructure availability. Using a survey of vehicle owners, the research compares attitudes towards EVs and petrol vehicles across various demographic groups. The findings reveal that while age has a weak influence on satisfaction levels, other factors like cost-effectiveness, convenience, and infrastructure availability play a more significant role in shaping consumer preferences. Despite increasing awareness of environmental issues, consumers in Ahmedabad show relatively low concern about the environmental impact of petrol vehicles. Moreover, while technological features and environmental friendliness influence satisfaction, infrastructure-related issues, particularly the accessibility of charging stations, remain a primary concern for EV owners. Edi Purwanto (2024) et al., in their work, "The Willingness to Purchase Electric Vehicles: A Comprehensive Review" investigated the multifaceted factors influencing consumers' willingness to purchase electric vehicles (EVs), providing a deeper understanding of the drivers behind EV adoption. The study draws on various scholarly sources to examine the intricate relationships among multiple determinants, including environmental concern, performance expectations, effort expectancy, charging point networks, charging time, price, operational costs, incentives, and attitude toward EVs. These factors are analysed within a conceptual framework, highlighting the pivotal role of attitude as a mediating variable. The review reveals that environmental concern, driven by awareness of the ecological impact of conventional vehicles, motivates individuals to opt for EVs as a more sustainable mode of transportation. Performance expectations, such as energy efficiency and emission reduction, significantly influence consumer preferences. Effort expectancy, indicating the ease of using EV technology, plays a critical role in adoption decisions. Charging infrastructure, both availability and accessibility, is a crucial facilitator of EV adoption, emphasizing the importance of robust charging networks.

Kamilah Ahmed (2024) et al., in their study, "Moving Towards Sustainable Purchase Behaviour: Determinants of Consumers' Acceptance of Electric Vehicles in Malaysia" examined the factors of consumer acceptance of EVs in Malaysia. This study specifically investigates six selected factors that may have a significant role in determining EV acceptance. The research was conducted using a quantitative approach, with data collected via an online questionnaire survey among consumers using snowball sampling. Based on 243 valid responses, the findings revealed that environmental concern, energy efficiency of EVs, cost consideration of EV purchases, government policy towards EVs, availability of charging infrastructure, and social influence are positively and significantly associated with consumer acceptance. This study highlights the importance of improving the user experience, resolving practical issues, and emphasising the benefits of EVs to expedite the transition to sustainable and eco-friendly EVs in the context of developing countries.

Nur Ayeesha Qiesteena Muzir (2022) et al., "Challenges of Electric Vehicles and Their Prospects in Malaysia: A Comprehensive Review" examined the challenges associated with implementing the electric vehicle culture in Malaysia are thoroughly reviewed, including the obstacles that the Malaysian government, policymakers, EV manufacturers, and EV users face in terms of EV cost, travel demand, charging station availability, impact on the power grid, and battery capacity. Then, all the identified challenges have been addressed by considering the user behaviour, travel demand, socio-economical culture of Malaysia, current policies taken by the government of Malaysia, and the psychological outlook of Malaysians towards EV adoption. Moreover, potential suggestions have been proposed that the government of Malaysia may adopt during policy planning and when seeking to provide incentives to the users. Finally, a concrete conclusion has been drawn by disseminating the vision about the future of EVs in Malaysia. The proposed review of the technologies, challenges, prospects, and potential solutions associated with EV adoption in Malaysia can provide a base for proper strategic policy and help policymakers frame strategies to achieve the targets. This review could help achieve sustainable EV transport, and the successful implementation of Malaysian National Automotive Plan 2020, with the goal of adopting next-generation green vehicles.

## 3. Objectives of the Study:

1. To examine the level of satisfaction post adoption by the EV car users.
2. To develop a model depicting the influence of demographic variables in the continuance usage intention of Electric Car users.

**4. Research Methodology:** This study makes use of primary data and purposive sampling method is used to select the sample respondents, who are currently using electric four vehicles. The respondents were reached by the survey prepared using Google forms. In order to make this study more practical a sample size of 130 respondents was selected. After eliminating incomplete questionnaire, a valid sample of 122 responses were used for analysis.

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**Conceptual Framework:**Continuance intention refers to the user's willingness to continue using EVs in the future rather than reverting to conventional vehicles. The conceptual framework of the study is designed to examine the relationship between perceived challenges, satisfaction, and continuance usage intention in the context of technology or service adoption. The framework proposes that users' perceived challenges significantly influence their level of satisfaction, which in turn affects their intention to continue using the technology or service. Perceived challenges are considered the independent construct and are represented through five dimensions: economic challenges, infrastructural challenges, policy challenges, psychological challenges, and technological challenges. These dimensions reflect the barriers and difficulties users may experience during adoption and usage. Satisfaction acts as a mediating construct that determines whether users are willing to continue usage in the future. Higher satisfaction levels are expected to positively influence continuance usage intention, reflecting users' willingness to repeatedly use the service or technology. The framework also incorporates age and monthly income as moderating variables. These demographic factors are included to examine whether the relationship between satisfaction and continuance usage intention differs across users belonging to different age groups and income levels. Overall, the framework provides a comprehensive understanding of behavioural and demographic influences on continuance usage intention.

**CONCEPTUAL FRAMEORK SHOWING CONTINUANCE USGAE INTETNION**

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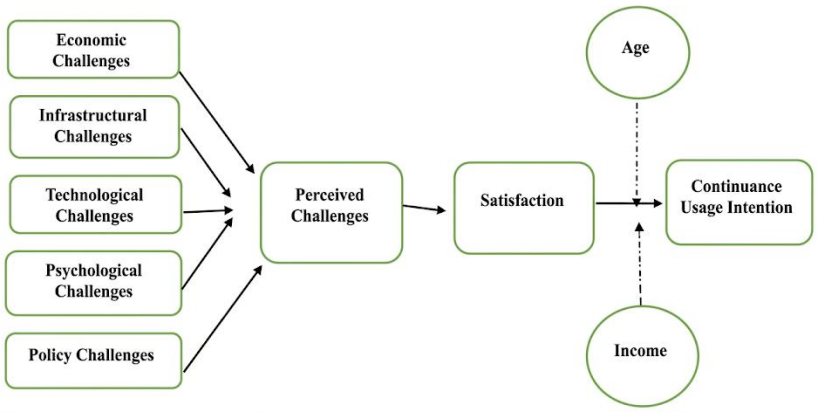


**5. Findings & Discussion:**

SPSS version 23 and PLS SEM software was used for data analysis. For the purpose of analysis descriptive statistics were obtained for frequency distribution.

**Table 5.1 Profile of the Respondents**

| Profile of the Respondents | | No. of Respondents | Percentage |
|---|---|---|---|
| Age | 18 - 25 | 26 | 21.3 |
| | 26 - 45 | 50 | 41.0 |
| | 46 - 60 | 36 | 29.5 |
| | Above 60 | 10 | 8.2 |
| | **Total** | **122** | **100.0** |
| Gender | Male | 86 | 70.5 |
| | Female | 36 | 29.5 |
| | **Total** | **122** | **100.0** |
| Educational Qualification | School Level | 22 | 18.0 |
| | Under Graduation | 69 | 56.6 |
| | Post-Graduation | 24 | 19.7 |
| | Others | 7 | 5.7 |
| | **Total** | **122** | **100.0** |
| Employment Status | Students | 3 | 2.5 |
| | Salaried | 64 | 52.5 |
| | Entrepreneurs | 47 | 38.5 |
| | Pensioneers | 8 | 6.6 |
| | **Total** | **122** | **100.0** |
| Monthly Family Income | 25000 – 50000 | 24 | 24.2 |
| | 50,001 – 75000 | 38 | 31.1 |
| | 75,001 – 100000 | 45 | 36.9 |
| | Above 100000 | 39 | 32.0 |
| | **Total** | **122** | **100.0** |

From the above table it is understood that the majority of respondents belongs to the age group of 26 – 45 are male having UG level education are salaried and having monthly family income 75001 – 100000.

**Table 5.2. Vehicle Ownership Profile**

| Profile of the Respondents | | No. of Respondents | Percentage |
|---|---|---|---|
| **Vehicle Brand** | Tata | 53 | 43.4 |
| | Hyundai | 31 | 25.4 |
| | Mahindra | 16 | 13.1 |
| | MG | 15 | 12.3 |
| | Kia | 4 | 3.3 |
| | Citroen | 3 | 2.5 |
| | **Total** | **122** | **100.0** |
| | 1 to 3 Years | 99 | 81.1 |
| | 3 – 4 Years | 23 | 18.9 |
| | **Total** | **122** | **100.0** |
| **Distance Covered** | Less than 5000 | 12 | 9.8 |
| | 5001 – 15000 | 58 | 47.5 |
| | 15001 – 25000 | 34 | 27.9 |
| | 25001 – 40000 | 17 | 13.9 |
| | More than 50000 | 1 | .8 |
| | **Total** | **122** | **100.0** |

From the above table it is understood that the most preferred four-wheeler brand of EV respondents is TATA and the respondents are using it for 1 – 3 years and have covered a distance of 5001 -15000 kms.

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**IMPACT OF SATISFACTION ON CONTINUANCE USAGE INTENTION:**

For the purpose of examining the relationship between the perceived challenges, satisfaction and continuance usage intention, the following hypotheses were formulated,

$H_1$: Perceived Challenges have an impact on satisfaction among EV adopters.

$H_2$: Satisfaction have an impact on continuance usage intention of EV adopters.

$H_3$: Satisfaction mediates the relationship between perceived usefulness and continuance intention.

$H_4$: Age have an impact on the relationship between satisfaction and continuance usage intention.

$H_5$: Income have an impact on the relationship between satisfaction and continuance usage intention.

The Total Variance Explained table shows how much of the total data variation is explained by the extracted factors in Exploratory Factor Analysis (EFA). In this study, four factors were extracted because their eigenvalues are greater than 1, which means these factors are important and should be retained for analysis. The first factor explains 33.596% of the total variance and has the highest contribution to the model. The second factor explains 13.947% of the variance, while the third and fourth factors explain 12.543% and 9.779% respectively.

Together, these four factors explain 69.865% of the total variance in the data. This means that nearly 70% of the information in the variables is successfully explained by the extracted factors, which is considered good.

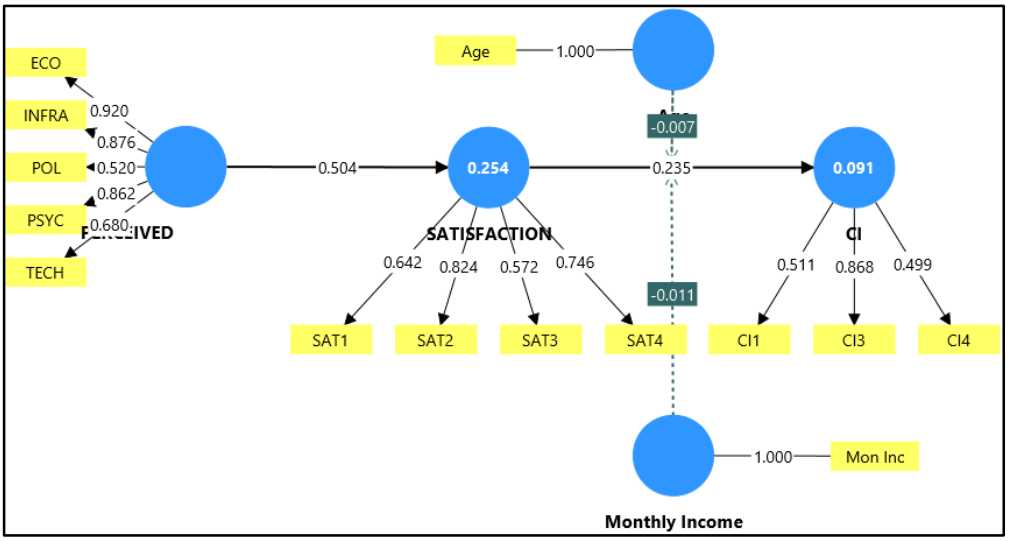
**Table 5.3 KMO and Bartlett's Test**

| | | |
|---|---|---|
| Kaiser-Meyer-Olkin Measure of Sampling Adequacy. | | .600 |
| Bartlett's Test of Sphericity | 636.281 | 2233.428 |
| | 66 | 105 |
| | .000 | .000 |

**Table 5.4 Rotated Component Matrix**

| Factor | Component | Item Description | Rotated Loadings | % of Variance |
|---|---|---|---|---|
| I | Perceived Challenges | Economic Challenges | 0.818 | 33.596 |
| | | Infrastructural Challenges | 0.736 | |
| | | Technological Challenges | 0.637 | |
| | | Psychological Challenges | 0716 | |
| | | Policy Challenges | 0.623 | |
| II | Satisfaction | I am satisfied with my EV purchase. | .729 | 13.947 |
| | | My EV meets my expectations. | .673 | |
| | | I am satisfied with the after-sales service for my EV. | .749 | |
| | | Overall, I would say buying an EV was a good decision. | .765 | |
| III | Continuance Usage | I would prefer an EV for my next vehicle purchase. | .523 | 12.543 |
| | | I would recommend an EV to friends/family. | .719 | |
| | | I speak positively about my EV to others. | .696 | |

**SEM MODEL SHOWING CONTINUANCE USAGE INTENTIONS**




**Measurement Model Interpretation:** The structural model examines the relationship between perceived challenges, satisfaction, and continuance usage intention, along with the moderating effects of age and monthly income. The results indicate that perceived challenges have a positive influence on satisfaction with a path coefficient of **0.504**. This suggests that users' experiences with economic, infrastructural, policy, psychological, and technological challenges significantly affect their satisfaction level. The $R^2$ value for satisfaction is **0.254**, which means perceived challenges explain 25.4% of the variation in satisfaction.

The relationship between satisfaction and continuance usage intention is positive with a path coefficient of **0.235**. This indicates that satisfied users are more likely to continue using the technology or service. However, the $R^2$ value for continuance intention is **0.091**, showing that satisfaction explains 9.1% of the variation in continuance intention, while other external factors may also influence users' future usage behaviour.

The moderating effect of age on the relationship between satisfaction and continuance intention is **-0.007**, which indicates a very weak negative effect. Similarly, monthly income shows a weak negative moderating effect with **-0.011.** These findings suggest that age and income do not significantly change the relationship between satisfaction and continuance usage intention.The measurement model shows acceptable indicator loadings for most variables. ECO (0.920), INFRA (0.876), and PSYC (0.862) strongly contribute to perceived challenges, while POL (0.520) and TECH (0.680) show moderate contributions. For satisfaction, SAT2 (0.824) and SAT4 (0.746) demonstrate strong loadings. Under continuance intention, CI3 (0.868) strongly represents the construct, whereas CI1 (0.511) and CI4 (0.499) show weaker contributions.Overall, the model indicates that perceived challenges influence satisfaction, and satisfaction positively affects continuance usage intention, while demographic variables such as age and income have minimal moderating influence.

**6. Conclusion:**

The findings indicate that perceived challenges significantly influence user satisfaction, highlighting the importance of economic, infrastructural, technological, policy-related, and psychological factors in shaping users' post-adoption experiences. The results further demonstrate that satisfaction positively affects continuance usage intention, suggesting that users who are satisfied with the technology or service are more likely to continue its usage over time. Although satisfaction was found to positively influence continuance intention, the relatively low explanatory power of the model indicates that continuance behaviour may also be influenced by additional contextual and behavioural factors not included in the present study. Furthermore, the moderating effects of age and monthly income were found to be negligible, implying that the relationship between satisfaction and continuance usage intention remains relatively consistent across different demographic groups.

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**Appendix**

| Variables | Measurement Items | Reference |
|---|---|---|
| Perceived Challenges | Technical Challenges | Adapted from Rezvani Z. et al. (2015); Hardman S. et al. (2017); Carley S. et al. (2013) |
| | Infrastructural Challenges | |
| | Economical Challenges | |
| | Psychological Challenges | |
| | Policy Challenges | |
| **Satisfaction** | I am satisfied with my EV purchase. | Adapted from Bhattacherjee A. (2001); Oliver R. L. (1980); Spreng R. A. et al. (1996) |
| | My EV meets my expectations. | |
| | I am satisfied with the after-sales service for my EV. | |
| | Overall, I would say buying an EV was a good decision. | |
| **Continuance Intention** | I would prefer an EV for my next vehicle purchase. | Adapted from Bhattacherjee A. (2001); Venkatesh V. et al. (2003); Davis F. D. (1989) |
| | I would recommend an EV to friends/family. | |
| | I speak positively about my EV to others. | |
| **Technical Challenges** | Battery capacity is reducing over time. | Adapted from Rezvani Z. et al. (2015); Hardman S. et al. (2017); Carley S. et al. (2013); Axsen J. & Kurani (2013) |
| | Charging the EV takes longer than expected. | |
| | EV may not cover long distances on one charge. | |
| | EV's performance drops in very hot or cold weather. | |
| **Infrastructure Challenges** | Non availability of enough public charging stations. | Adapted from Rezvani Z. et al. (2015); Hardman S. et al. (2017); Carley S. et al. (2013) |
| | Difficult to access fast-charging facilities when needed. | |
| | Facing problems while charging EV in home or work. | |
| | Hard to find skilled mechanics or service centres for EVs. | |
| **Economic Challenges** | Cost of replacing the EV battery is a major concern. | Adapted from Rezvani Z. et al. (2015); Hardman S. et al. (2017); Carley S. et al. (2013) |
| | EV have a low resale value in the future. | |
| | Insurance for EVs feels higher compared to regular vehicles. | |
| | The cost of owning an EV feels high. | |
| **Psychological Challenges** | Less confident about the long-term reliability of EV. | Adapted from Rezvani Z. et al. (2015); Hardman S. et al. (2017); Carley S. et al. (2013) |
| | Using an EV does not always fit well with travel needs. | |
| | Learning to use EV features was difficult at first. | |
| **Policy Challenges** | Government subsidies and incentives for EVs are not stable. | Adapted from Rezvani Z. et al. (2015); Hardman S. et al. (2017); Carley S. et al. (2013) |
| | Charging prices are not the same everywhere. | |
| | Current policies do not fully support EV users. | |

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