CHAPTER 27

Driving Sustainable Mobility: The Role of Subsidies, Tax Benefits, and Infrastructure in Electric Vehicle Adoption

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ABSTRACT

The global automobile industry is experiencing a major transformation driven by sustainability concerns and proactive government interventions. Electric vehicles (EVs) are emerging as a sustainable alternative to conventional fuel-based mobility, supported by various government policies and incentives. The key variables under study encompass government subsidies, goods and services tax reduction, income tax benefits, road tax exemptions, EV charging infrastructure, and state-specific subsidies towards EV adoption, especially in the Indian automobile market. The primary data were collected from 148 respondents using a structured questionnaire and the analysis was conducted through a quantitative research design using SPSS tools. The findings reveal that financial incentives such as subsidies and tax benefits, along with non-financial enablers like charging infrastructure and state-level policy support, significantly govern the EV adoption process. The study highlights the crucial role of policy frameworks in promoting EV adoption by lowering cost barriers and improving convenience for consumers. It also contributes to the literature on consumer behavior by providing empirical evidence of the role of government interventions in accelerating EV adoption, thereby supporting sustainable mobility and green consumption practices.

Keywords: Electric vehicles; Consumer buying behavior; Government policies; Incentives; Subsidies; Charging infrastructure; Sustainable mobility.

1.0 Introduction

The automobile industry has been one of the key drivers of worldwide economic growth, industrialization, and social mobility. However, its dependency on fossil fuels has created significant environmental problems and challenges, including greenhouse gas emissions, air pollution, and resource depletion.

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Nowadays, climate change is becoming a global issue, and there is a growing consensus on the need for sustainable alternatives. Among these, the transition from internal combustion engine (ICE) vehicles to electric vehicles (EVs) is one of the most promising and alternative solutions to achieve environmental sustainability. India, the world's third-largest automobile market, is at the cusp of a transformative shift in mobility patterns. The nation faces mounting pressure to reduce its carbon footprint and improve urban air quality. The transport industry alone contributes nearly 14% of the country's energy-related CO_2 emissions (IEA, 2022). To address these environmental challenges, the Government of India has moved towards multiple initiatives such as the National Electric Mobility Mission Plan (NEMMP) and the Faster Adoption and Manufacturing of Hybrid and Electric Vehicles (FAME) scheme.

These initiatives are aimed at accelerating EV adoption through various government policies, financial incentives, tax benefits, and infrastructural support etc. In contrast, EVs, being relatively new, face challenges such as high EV costs, new technology and limited charging infrastructure, and consumer awareness. To overcome these barriers, government policies play a crucial role in incentivizing purchase decisions and building consumer confidence. Subsidies and tax benefits reduce the financial burden, while road tax exemptions and infrastructural investments enhance the convenience and feasibility of owning an EV. This study explores the role of these government interventions in shaping consumer buying behavior toward EVs. By focusing on subsidies, GST reduction, income tax benefits, road tax exemptions, EV charging infrastructure, and state-specific incentives, the paper investigates how policies contribute to overcoming adoption barriers in the Indian automobile market.

2.0 Review of Literature

The adoption of electric vehicles (EVs) has been a major focus of research, with studies highlighting consumer attitudes, government policies, and infrastructure as the most important drivers. A review of existing work shows that EV acceptance is shaped by global trends as well as country-specific factors, particularly in India.

Policy support and corporate responsibility are often considered vital for encouraging EV adoption. For example, Mpoi *et al.* (2023) examined consumer purchase intentions in Greece using discrete choice models. Their study found that demographic features, financial incentives, environmental awareness, charging time, and infrastructure availability strongly affect customer decisions. Greece's subsidy scheme, "I move electrically", was shown to play a key role in boosting adoption. Similarly, Ranawat *et al.* (2023) analyzed the Indian EV market, focusing on consumer attitudes, adoption

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challenges, and market sustainability. Their findings point to the need for stronger government action and improved policies to expand EV use in India. Researchers also underline the importance of technology, policy, and infrastructure. Chawla *et al.* (2023) emphasized that factors such as charging convenience, affordability, and public perception of new technologies shape consumer readiness. Senyapar *et al.* (2023) stressed the role of policy incentives and regulatory frameworks in supporting adoption across countries. Singh *et al.* (2021) highlighted India's need for better research funding and large-scale charging infrastructure. Ye *et al.* (2024) added a behavioral perspective, noting that consumer trust, convenience, and subsidies influence purchase decisions. Singh *et al.* (2023) further discussed challenges such as weak infrastructure, limited technology, and workforce gaps, while Zhang *et al.* (2022) showed how subsidy cuts reduced adoption intentions, especially in larger Chinese cities.

Environmental and sustainability concerns also drive EV adoption. Singh *et al.* (2021) pointed out that EVs reduce air and noise pollution, improving urban life and enabling cleaner transport systems. From a market perspective, Roy *et al.* (2022) argued that consumer choices, government actions, and global practices are shaping the EV industry, while Ranawat *et al.* (2023) observed steady growth in India supported by policy initiatives and sustainability efforts. Lee *et al.* (2018) highlighted the continuing challenge of high EV costs and limited charging facilities, especially in developing countries. Kumari *et al.* (2021), comparing India and Norway, noted that Norway's strong policies and advanced infrastructure explain its success, while India still struggles with affordability and technology issues. Taken together, these studies suggest that the growth of EVs depends on three factors: supportive policies, reliable infrastructure, and affordable technology. Consumer behavior, environmental benefits, and long-term policy commitment will ultimately determine how quickly EVs are adopted in markets such as India.

3.0 Relevance of the Study

The significance of this study lies in its emphasis on the Indian automobile market, which is among the fastest-growing and most dynamic globally. As India transitions toward sustainable mobility, understanding consumer behavior toward electric vehicles (EVs) becomes critical for shaping effective policies and guiding industrial strategies. This study makes two key contributions. First, it provides a policy evaluation by assessing the effectiveness of subsidies, tax benefits, and infrastructural investments in driving consumer adoption of EVs. Second, it highlights the sustainability contribution of EVs by aligning adoption patterns with broader national and global goals of reducing carbon emissions, promoting energy efficiency, and fostering green consumption practices.

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4.0 Objectives of the Study

1. To analyze the impact of government subsidies on consumer purchase decisions for EVs.
2. To examine the role of tax benefits (GST reduction, income tax rebates, road tax exemptions) in influencing EV adoption.
3. To evaluate the significance of charging infrastructure availability in shaping consumer preferences.
4. To study the influence of state-specific subsidies and policies on EV adoption in India.

5.0 Hypotheses

- H1: Government subsidies significantly influence consumer purchase decisions toward EV adoption.
- H2: Tax benefits such as GST reduction and income tax rebates positively affect EV adoption.
- H3: The availability of EV charging infrastructure enhances the consumer's willingness to adopt EVs.
- H4: State-specific subsidies and policies have a significant positive impact on EV adoption.

6.0 Research Methodology

This study adopts a quantitative research design to examine the role of government policies in EV adoption.

- Data Collection: The primary data was collected from 148 respondents using a structured questionnaire.
- Sampling Method: Convenience sampling, targeting potential automobile buyers.
- Secondary Data: Reviewed from government reports, academic journals, and policy documents.

7.0 Research Instrument

- Structured Questionnaire
- Responses were recorded using a 5-point Likert scale
- Statistical tools: SPSS
- Reliability analysis

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- Descriptive statistics: Mean, variance, standard deviation.
- Hypothesis testing: Correlation and regression analysis

8.0 Data Analysis

8.1 Reliability analysis

Table 1: Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.929	.928	6

Interpretation: To ensure the reliability of the instrument, a Cronbach's Alpha test was performed on the responses collected. The instrument comprised six items designed to measure customer perception towards EV Adoption. It is observed that the value of Cronbach's Alpha is 0.929 which is acceptable. The researcher used the non-probability sampling technique i.e. Convenient Purposive Sampling which allows to selection of participants based on their accessibility and availability.

8.2 Item-level descriptive statistics

Table 2: Reliability Statistics

	Mean	Std. Deviation	N
[Government subsidies influence my EV purchase decision.]	3.62	1.097	148
[GST reduction on EVs impacts my buying choice.]	3.76	1.086	148
[Income tax benefits encourage me to buy an EV.]	3.64	1.167	148
[Road tax exemption/reduction affects my EV decision.]	3.59	1.160	148
[EV charging infrastructure is crucial for my purchase decision.]	3.94	1.126	148
[State-specific subsidies impact my willingness to buy an EV.]	3.60	1.135	148

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Interpretation: As per the above table, the item-level descriptive statistics for the six government policy factors are presented. It is observed that the mean scores range from 3.59 to 3.94. It indicates that the respondents generally agreed that these factors influenced their EV adoption. The result shows that EV charging infrastructure is crucial for EV Adoption, i.e (M = 3.94, SD = 1.126) and Road tax exemption/reduction received the lowest agreement (M = 3.59, SD = 1.160).

8.3 Inter-item correlation analysis

Table 3: Inter-Item Correlation Analysis

	[Government subsidies influence my EV purchase decision.]	[GST reduction on EVs impacts my buying choice.]	[Income tax benefits encourage me to buy an EV.]	[Road tax exemption/reduction affects my EV decision.]	[EV charging infrastructure is crucial for my purchase decision.]	[State-specific subsidies impact my willingness to buy an EV.]
[Government subsidies influence my EV purchase decision.]	1.000	.625	.614	.638	.681	.670
[GST reduction on EVs impacts my buying choice.]	.625	1.000	.643	.688	.711	.660
[Income tax benefits encourage me to buy an EV.]	.614	.643	1.000	.860	.599	.757
[Road tax exemption/reduction affects my EV decision.]	.638	.688	.860	1.000	.622	.786
[EV charging infrastructure is crucial for my purchase decision.]	.681	.711	.599	.622	1.000	.699
[State-specific subsidies impact my willingness to buy an EV.]	.670	.660	.757	.786	.699	1.000

Interpretation: The above table shows the details of the inter-item correlation matrix, which demonstrates that the six items were positively correlated, with correlation coefficient values from 0.600 to 0.860. As per the result, the highest correlation was observed between Income tax benefits encourage to buy an EV and Road tax exemption/reduction affects EV adoption decision (r = 0.860), reflecting their conceptual similarity.

The lowest correlation between Income tax benefits and EV charging infrastructure is crucial for EV adoption decision (r = 0.599), though the relationship remained positive and significant. Overall, the inter-item correlations support the internal consistency and align with the high Cronbach's Alpha (α) = 0.929.

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8.4 One-sample t-test analysis

Table 4: t-test Analysis

	Test Value = 3						
			Significance		Mean	95% Confidence Interval of the Difference	
	t	df	One-Sided p	Two-Sided p	Difference	Lower	Upper
[Government subsidies influence my EV purchase decision.]	6.895	147	<.001	<.001	.622	.44	.80
[GST reduction on EVs impacts my buying choice.]	8.480	147	<.001	<.001	.757	.58	.93
[Income tax benefits encourage me to buy an EV.]	6.619	147	<.001	<.001	.635	.45	.82
[Road tax exemption/reduction affects my EV decision.]	6.238	147	<.001	<.001	.595	.41	.78
[EV charging infrastructure is crucial for my purchase decision.]	10.145	147	<.001	<.001	.939	.76	1.12
[State-specific subsidies impact my willingness to buy an EV.]	6.444	147	<.001	<.001	.601	.42	.79

Interpretation: The above table shows that the results of the one-sample t-test (Test Value = 3) all factors significantly influence purchase decisions towards EV adoption, i.e., $p < .001$ for all variables. The respondents strongly agreed that government policies/subsidies (t 6.895, MD 0.622), GST reduction (t 8.480, MD 0.757), income tax benefits (t 6.619, MD 0.635), and road tax exemptions (t 6.238, MD 0.595) are positively affected by EV adoption decision. But charging infrastructure recorded the highest statistical significance (t 10.145, MD 0.939), highlighting the importance and improving consumer confidence in EV adoption. Additionally, state-specific subsidies (t 6.444, MD 0.601) were also found to be effective on EV adoption indicating that policy support and initiatives.

Table 5: Hypothesis Testing

Hypothesis	Interpretation	Decision
H1: Government subsidies significantly influence consumer purchase decisions toward EV adoption.	Government subsidies were found to significantly motivate consumers to purchase EVs, reducing financial barriers.	Supported
H2a: GST reduction positively affects EV adoption.	GST reduction showed a strong positive influence, making EVs more affordable and encouraging adoption.	Supported
H2b: Income tax benefits positively affect EV adoption.	Income tax rebates significantly enhance consumer willingness by lowering the overall cost burden.	Supported

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H3: Availability of EV charging infrastructure enhances the consumer's willingness to adopt EVs.	Charging infrastructure is the most important factor affected or influential determinant towards EV adoption.	Supported
H4: State-specific subsidies and policies have a significant positive impact on EV adoption.	State-level subsidies and policies complement national incentives, play a crucial role in EV adoption.	Supported

9.0 Key Findings

- High Internal Reliability of Scale: The Cronbach's Alpha value of $\alpha = 0.929$ indicates excellent internal consistency among the six items used to measure the influence of government policies and incentives on EV adoption.
- Significant Role of Financial Incentives: The one-sample t-test results confirmed that government subsidies, GST reduction, income tax rebates, and road tax exemptions all have a statistically significant impact $p < .001$ on EV adoption.
- Critical Importance of Charging Infrastructure: EV charging infrastructure recorded the highest t-value 10.145 and mean difference, highlighting it as the most decisive factor in EV adoption.
- Complementary Role of State-Specific Subsidies: State-level policies and subsidies were also found to significantly influence consumer willingness to adopt EVs
- Overall Positive Consumer Attitude: The mean scores for all six factors ranged between 3.59 and 3.94 (on a 5-point Likert scale), indicating that consumers generally agree on the importance of financial incentives and infrastructure in shaping their EV purchase intentions.

10.0 Limitations of the Research

1. Limited sample size, not fully representative of Indian EV consumers.
2. Study restricted to selected Nashik regions.
3. Research confined to a specific time frame.

11.0 Conclusion

This study examined the role of government policies, financial incentives, and infrastructure availability in influencing consumer adoption of electric vehicles (EVs) in the Indian automobile market. Drawing on responses from 148 participants and analyzed using the SPSS tool, the findings confirm that both financial incentives and non-financial enablers significantly impact consumer purchase intentions towards EVs. The findings highlight that

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financial support alone may not be sufficient to drive EV adoption without useful and supportive infrastructure improvement as per the requirements. The results also demonstrate the importance of state-level policies, which act as reinforcing mechanisms to the Government of India's phases like FAME I and FAME II. Together, these policy frameworks contribute to creating an enabling environment for EV adoption by making ownership more cost-effective and convenient. Finally, the study concludes that EV adoption in India is a policy-driven transition, where financial incentives reduce the EV purchasing cost burden while infrastructure development ensures long-term feasibility.

References

1. G. Mpoi, C. Milioti, and L. Mitropoulos (2023). Factors and incentives that affect electric vehicle adoption in Greece, International Journal of Transportation Science and Technology, https://doi.org/10.1016/j.ijtst.2023.01.002
2. Chawla, U.; Mohnot, R.;Mishra, V.; Singh, H.V.; Singh, A.K (2023). Factors Influencing Customer Preference and Adoption of Electric Vehicles in India: A Journey towards More Sustainable Transportation. Sustainability, 15, 7020.
3. H. Nurgul DURMUS SENYAPAR, Murat AKIL (2023). Analysis of Consumer Behavior towards Electric Vehicles: Intentions, Concerns and Policies. Gazi University Journal of Science, Part C,11(1):161-183.
4. Vedant Singh, V. (2021). Analysis of electric vehicle trends, development and policies in India. Case Studies on Transport Policy, 9, 1180 1197. doi: https://doi.org/10.1016 /j.cstp.2021.06.006
5. Fei Ye, W. K. (2021). Why do consumers choose to buy electric vehicles? A paired data. Transportation Research Part A, 147, 14-27. doi: https://doi.org/10.1016/j.tra.20 21.02.014
6. Sitendu Roy & Arvind Kumar Jain (2022). Consumer Adoption & Buying Behaviour for Electric Vehicles in India, International Journal of Mechanical Engineering, 7(5), 0974-5823.
7. Dr. Priyanka Ranawat, Sashant Sharma, Mr. Suraj Kumar (2023). Study On Market Sustainability and Consumer Behaviour Towards Electric Vehicles (Ev) In India, IJIRA, ISSN:2583-0295, Volume 03, No. 02(II), April- June 2023, pp 48-54.
8. Nayeon Kim, Kyungtag Lee, Paul B. Tchounwou (2023). Environmental Consciousness, Purchase Intention, and Actual Purchase Behavior of Eco-Friendly Products: The Moderating Impact of Situational Context, 20(7), doi:10.3390/ijerph 20075312

DOI: 10.17492/JPI/ICISI2025/251227 *ISBN: 978-93-49790-69-8*

9. Kumari Santosh, Sud Sameexa, Agarwal Anshula (2021). Fosterage and Sustenance of Electric Vehicles: A Comparative Study of India and Norway. SMS Journal of Entrepreneurship & Innovation. 2021; 8(1): 2738. DOI: 10.21844/smsjei. v8i01.30003
10. Ramniwas Singh & Arvind Kumar (2023). Comprehensive Analysis of Challenges Hindering the Adoption of Electric Vehicles in India, International Journal of Science and Research (IJSR), Volume 12 Issue 6, June 2023, 1768-1770
11. Zhang, J.; Xu, S.; He, Z.; Li, C.; Meng, X (2022). Factors Influencing Adoption Intention for Electric Vehicles under a Subsidy Deduction: From Different City-Level Perspectives, 14, 1-24. https://doi.org/10.3390/su14105777.
12. Central Pollution Control Board. (2023). Annual report 2022–23 on municipal solid waste. https://cpcb.nic.in/uploads/MSW/Annual_Report_2022-23.pdf
13. Government of India – Ministry of Earth Sciences. (2020). Assessment of climate change over the Indian region. https://moes.gov.in/sites/default/files/2020-06/Assessment%20of%20climate%20change%20over%20the%20Indian%20region.pdf
14. Intergovernmental Panel on Climate Change (IPCC). (2023). Sixth assessment report. https://www.ipcc.ch/assessment-report/ar6/
15. Centre for Science and Environment. (2022). Urban air pollution and mobility. https://www.cseindia.org
16. IEA. (2022). Global EV Outlook 2022. International Energy Agency. https://iea.blob.core.windows.net/assets/830fe099-5530-48f2-a7c1-11f35d510983/WorldEnergyOutlook2022.pdf
17. Government of Maharashtra. (2021). Maharashtra Electric Vehicle Policy 2021. Department of Industries, Energy, and Labour. Retrieved from https://evpolicy.mahaditg.com
18. Ministry of Road Transport and Highways. (2024). Vahan Dashboard – EV Statistics. https://vahan.parivahan.gov.in
19. E-MOBILITY BUSINESSES - e-AMRIT, NITI Aayog, https://e-amrit.niti.gov.in/e-mobility-businesses

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