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"Rural Consumer Buying Behaviour Towards Electric Vehicles: A Gorakhpur-Based Study"

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ABSTRACT*

This study examines the buying behaviour of rural consumers towards electric vehicles (EVs) in Gorakhpur, India. A mixed-methods approach was used, combining a survey (n=200) and in-depth interviews (n=20). The findings reveal that while rural consumers are increasingly aware of EVs, adoption is hindered by inadequate charging infrastructure, high upfront costs, and limited product knowledge. However, environmental concerns, government incentives, and lower operating costs drive interest in EVs. The study identifies key demographic and psychographic factors influencing EV adoption, providing insights for policymakers, manufacturers, and marketers to effectively target rural consumers. This research contributes to understanding rural consumer behaviour towards EVs in India, informing strategies to accelerate EV adoption and achieve sustainable transportation goals.

Keywords: - Electric Vehicles, Rural Consumers, Buying Behaviour, Gorakhpur, Sustainable Transportation.

Introduction

The Indian government's ambitious plan to achieve 100% electric vehicle (EV) sales by 2030 has sparked a wave of interest in understanding consumer behavior towards EV adoption. While urban consumers have been the primary focus of EV marketing efforts, rural consumers remain a significant untapped market. With over 65% of India's population residing in rural areas, understanding their buying behavior towards EVs is crucial for achieving sustainable transportation goals.

Gorakhpur, a rural district in Uttar Pradesh, India, serves as an ideal case study due to its growing economy, increasing vehicle ownership, and limited EV adoption. This study aims to explore rural consumer awareness, perceptions, and buying behavior towards EVs in Gorakhpur, identifying key factors influencing their adoption decisions. By providing insights into rural consumer behavior, this research will inform policymakers, manufacturers, and marketers on effective strategies to accelerate EV adoption in rural India, contributing to a sustainable transportation future.

Background:

India's transportation sector is one of the largest contributors to greenhouse gas emissions, with vehicles accounting for over 10% of total emissions. To mitigate this, the Indian government has set an ambitious target of achieving 100% electric vehicle (EV) sales by 2030. This push for EVs is driven by the need to reduce dependence on fossil fuels, decrease air pollution, and meet global climate change commitments.

While urban consumers have been the primary focus of EV marketing efforts, rural consumers remain a significant untapped market. Rural India accounts for over 65% of the country's population, with increasing vehicle ownership and a growing middle class. Understanding rural consumer behavior towards EVs is crucial for several reasons:

1. Market potential: Rural consumers represent a vast, untapped market for EVs, with potential for significant sales growth.

2. Sustainable transportation: Rural areas often have limited public transportation, making personal vehicles a necessity. EVs can provide a sustainable alternative to traditional fossil fuel-based vehicles.

3. Energy access: Rural areas often face energy access challenges. EVs can provide a reliable, clean energy source for transportation.

4. Climate change mitigation: Rural consumers can play a significant role in reducing India's carbon footprint by adopting EVs

Types of Electric Vehicle

Three types of electric vehicles are typically mentioned when discussing them: battery electric vehicles, plug-in hybrid electric vehicles, and hybrid electric vehicles (BEV)

Consumer Purchasing Patterns Consumer buying behaviour refers to a customer's actions prior to making a purchase of a good or service (both online and offline). This could involve using search engines, leaving comments on social media posts, and a variety of other activities. Understanding this process benefits businesses because it enables them to better match their marketing initiatives to earlier marketing campaigns that have effectively persuaded clients to make purchases.

Factors affecting rural customers' purchasing decisions

- Cultural aspects - One's culture is not solely determined by their nationality. Their religious convictions, associations, or even region may have an impact.
- Social aspects are characteristics of a person's environment that affect how they perceive a product.
- Personal Variables - Age, marital status, financial situation, as well as one's own opinions, morals, and values, are all examples of personal variables.
- Psychological aspects - Whenever a person is presented with a product, their mental state frequently has an impact on how they feel about the product and the brand as a whole.

Research Gap:

While there is a growing body of research on electric vehicle (EV) adoption in India, most studies focus on urban consumers, neglecting the rural market. The existing literature highlights several research gaps:

1. Urban bias: Current studies primarily focus on urban consumers, overlooking the unique characteristics and needs of rural consumers.

2. Lack of empirical data: There is a scarcity of empirical data on rural consumer behavior towards EVs, making it challenging to develop effective marketing strategies and policy interventions.

3. Insufficient understanding of rural consumer motivations: The motivations and barriers influencing rural consumers' EV adoption decisions are not well understood, hindering the development of targeted initiatives.

4. Neglect of regional differences: India's rural areas are diverse, with varying socio-economic profiles, infrastructure, and cultural

contexts. Existing studies often fail to account for these regional differences.

5. Limited exploration of enablers and barriers: Research has not adequately explored the enablers and barriers to EV adoption in rural India, such as charging infrastructure, product awareness, and affordability

Objective of the study

- To explore rural consumer awareness and perceptions of EVs in Gorakhpur.
- To identify factors influencing rural consumer buying behavior towards EVs.
- To provide insights for policymakers, manufacturers, and marketers.

Reasons for Corporate to go Rural

Reasons for Corporate to go Rural
In the present scenario, companies operating in India will have only two options either goGlobal or go Rural. The cost of going global is very high, and it's difficult to gauge marketsin other countries. It's better to target the rural market as it is growing by the day. Rural India is emerging as a large market for a number of goods and services – financial services, healthcare, education and telecommunication, etc. Here are some of the reasons why corporates are more interested in making a foray in the rural markets: Saturated Urban Markets- There is cutthroat competition in urban markets, with a wide variety of choices ofproducts. It's becoming difficult for existing companies to maintain their marketshare in urban markets. Untapped Market Potential - With only 100,000 of the 638,667 villages tapped so far, there is a huge potential andmarket area. With a rural population of more than 833.1 million, it is a huge market. Remittances from Abroad- Many household in rural India have one of their family members abroad, mostly inGulf countries. People working there send their savings to their families in India,which is an additional source of income. Impact of Media- The growing reach of the electronic media has created a huge change in the lifestyleof rural consumers because of TV programmes. Ruralpeople are spending more on lifestyle products than their urban counterparts In the present scenario, companies operating in India will have only two options either goGlobal or go Rural. The cost of going global is very high, and it's difficult to gauge marketsin

other countries. It's better to target the rural market as it is growing by the day. Rural India is emerging as a large market for a number of goods and services – financial services, healthcare, education and telecommunication, etc. Here are some of the reasons why corporates are more interested in making a foray in the rural markets:

The only two options available to Indian businesses now are to go global or go rural. The price of a global emphasis is significantly higher than a rural one. Targeting the local market makes sense because it is expanding daily. A sizable market for numerous goods and services, including financial services, healthcare, education, and telecommunications, has developed in rural India. Listed below are some of the motives behind businesses' interest in serving rural markets:

Saturated Urban Markets – A wide range of products are escalating competitiveness in the urban market. Existing businesses are finding it harder and harder to hold onto their portion of the urban market.

Undeveloped Market Potential – Only 125,000 of the 638,667 communities that have been established to yet have a sizable market. This market is substantial, with about 833.1 million rural residents.

Impact of Media- Because of television programmes and mobile advertising, the rising reach of electronic media has significantly altered rural consumers' way of life. Compared to urban dwellers, rural folks place more emphasis on lifestyle products.

Literature Review

ViorelTrifa, Calin Marginean, LiviuZarnescu (2006) did a case study on "The Implementation of an Electric Bicycle Using Reluctant Motors". The article gives a broad overview of the use of electric bikes with reluctance motors for personal urban transportation. The example used is a specific instance from the city of Cluj-Napoca. It includes a study of the opportunity, the state-of-the-art for electrically powered bikes, and a suggested solution. According to the study, a mountainous city like Cluj-Napoca exhibits good performance in terms of the needs of a personal transportation vehicle.

Bhupendra kumar verma (2011) According to his article, based on the results of this research, the following recommendations can be

made to boost the effectiveness of electric bike sales. By giving customers coupons and literature in different regional languages, it is necessary to increase their understanding of the numerous additional features that an electric bike offers. The many manufacturers of electric bikes should engage in honest, reasonable, and free competition.

Hatwar, N.; Bisen, A.; Dodke, H.; Junghare, A.; Khanapurkar, M. (2013). In order to increase speed and address issues about the long charging times and low battery lives, a new approach to e-bike design was projected that uses a hybrid system of battery and super capacitor.

(Anable & Morton, 2016) focused on determining whether consumer innovation related to the indicated preference for EVs in order to understand customer response to EVs. Consumer innovativeness, according to him, is the ability and readiness of consumers to accept new products with unique or advanced features and functionalities. Electric vehicles have drastically different technical characteristics than cars with internal combustion engines.

The practical differences between EVs and conventionally powered vehicles are more specifically the vehicle range, price premiums, operating costs, refuelling habits, and alleged environmental benefits. Thus, some observers have referred to EVs as a form of disruptive innovation (Christensen, 1997). It is difficult to forecast predicted consumer responses based on the current market for internal combustion engines due to the distinctive features of electric cars and their current low sales volumes (DfT, 2013).

(Tornekar, 2020) listed the eight potential causes of India's poor EV growth. He listed the following factors as barriers to the rise of EVs in India: charging times, prices, range based on battery capacity, infrastructure for charging, limited battery life, fear of new technology, government incentives, a lack of ads, and awareness campaigns.

(Nath, 2021) In June of this year, according to his journal, the Indian government modified the present FAME-II (Faster Adoption and Manufacturing of Electric Vehicles-II) initiative. By increasing the subsidy rate for electric two-wheelers from Rs 10,000/kWh to Rs 15,000/kWh and capping incentives at 40% of vehicle expenses, rather than the previous 20%, the government reduced the price

gap between petrol-powered and electric two-wheelers. With the aim of having at least one charging station in every 3 km x 3 km grid, this strategy also supports 2,700 charging stations in the nation's largest cities, other cities with a population of over a million, smart cities, and cities in hilly states. In addition, every 25 kilo metres on highways, recharge stations are planned.

(Kalra, 2022) studied The capital cost has always been a significant factor in EV purchasing decisions, with 63 percent of consumers surveyed feeling that an EV is outside of their budget. The inadequate charging infrastructure in our nation is a significant barrier to wider EV adoption. However, significant OEMs are also making efforts to enter the EV component market in order to reduce their reliance on imports and meet the government's need for a 50% localization rate in order to qualify for government subsidies. But he also noted that a thorough infrastructure that is affordable, available to all consumer groups, and supports them, as well as a stable financial environment, governmental incentives, and technological advancements, are anticipated to position the electric vehicle industry for significant growth over the following ten years.

Research Methodology

This study employed a mixed-methods approach, combining both quantitative and qualitative methods to explore rural consumer behavior towards electric vehicles (EVs) in Gorakhpur, India.

Quantitative Method

A survey questionnaire was designed to collect data from rural consumers in Gorakhpur. The questionnaire consisted of:

- Demographic information
- Awareness and knowledge of EVs
- Attitudes towards EVs
- Perceived benefits and barriers to EV adoption
- Intention to purchase EVs

The survey was administered to 200 rural consumers, selected using a stratified random sampling technique.

Qualitative Method

In-depth interviews were conducted with 20 rural consumers to gather more detailed, qualitative insights into their perceptions and experiences with EVs. The interviews explored:

- Awareness and understanding of EVs
- Motivations and barriers to EV adoption
- Experiences with EVs (if applicable)
- Suggestions for improving EV adoption in rural areas

Data Analysis

Quantitative data was analyzed using descriptive statistics and factor analysis. Qualitative data was analyzed using thematic analysis.

Ethics

Informed consent was obtained from all participants, and confidentiality was ensured.

By using a mixed-methods approach, this study aimed to provide a comprehensive understanding of rural consumer behavior towards EVs in Gorakhpur, India

Primary data:

200 respondents, all of whom use bicycles and vehicles, completed questionnaires to provide the primary data.

Secondary data:

The secondary data has been collected from various journals and websites.

Three sections made up the questionnaire.

- Section 1 - Information about the respondent's identity.
- Section 2 - Whether the respondent is ready to move to an electric vehicle or not.
- Section 3 - What the responder thinks about electronic vehicles.

Section 1: Information about the respondent's identity.

S. No.	Gender	Frequency	Percentage (%)
1.	Male	160	80%
2.	Female	40	20%
Total		200	100%

Table 1: Gender of the respondent

The respondents were split into two groups according to their gender. In table 1, the frequency and proportion of responders are displayed. 160 responses (80%) are men and 40 respondents (20%) are women out of 200 respondents.

S. No.	Age	Frequency	Percentage (%)
1.	Under 25	50	25%
2.	25-40	56	28%
3.	41-55	60	30%
4.	Above 55	34	17%
Total		200	100

Table 2: Age of the respondent

Based on the age of the respondents, the respondents were separated into 4 categories. Table 2 provides information on the frequency and proportion of responses. There were 200 responders, of whom 50 (25%) were under 25, 56 (28%) were in the 25–40 age range, 60 (30%) were in the 41–55 age range, and 54 (16%) were beyond 55.

S. No.	Qualification	Frequency	Percentage (%)
1.	Undergraduate	113	56.5%
2.	Postgraduate	87	43.5%
Total		200	100%

Table 3: Qualification of the respondent

Based on the respondent qualifications, the respondents were split into two groups. Table 3 displays the frequency and proportion of respondents. 87 respondents (43.5%) and 113 respondents (56.5%) with undergraduate degrees, respectively, out of 200 respondents, had postgraduate degrees.

Section 2: Whether the respondent is ready to move to an electric vehicle or not.

S. No.	Buying EV	Frequency	Percentage (%)
1.	No doubt, I'll purchase one	38	19%
2.	Am likely to purchase one	71	35.5%
3.	Thought about purchasing one, but I need persuasion	44	22%
4.	Unlikely to purchase one	16	8%

5.	Definitely won't purchase one	10	5%
6.	I'm not sure	21	10.5%
total		200	100%

Table 4: How likely is it that the respondent will think about purchasing an electric car in the next two years?

On the basis of their interest in purchasing an electronic car, the respondents were classified into 6 categories. Table 4 displays the frequency and proportion of responders. Out of 200 respondents, 38 (19%) were certain to purchase one, 71 (35.5%) were likely to purchase one, 44 (22%) were debating purchasing but needed more convincing, 16 respondents (8%) indicated they were unlikely to buy, 10 indicated they were not going to buy, and 21 indicated they were unsure about their decision.

S. No	Reason	Frequency	Percentage (%)
1.	Petrol price hikes	95	47.5%
2.	To protect the environment	63	31.5%
3.	Less pollution and less noisy	42	21%
	Total	200	100%

Table 5: Why the respondent is willing to switch to an EV?

The respondent had a variety of options to choose from when indicating why they would be inclined to switch to an EV. Table 5 displays the frequency and proportion of respondents. Out of 200 respondents, 95 chose higher gas prices (47.5%), 63 chose environmental protection (31.5%), and 42 chose reduced noise and pollution (21%).

Section 3: What the responder thinks about electronic vehicles.

S. No.	Views	Frequency	Percentage (%)
1.	Strongly Disagree	12	6%
2.	Disagree	8	4%
3.	Neutral	45	22.5%
4.	Agree	45	22.5%
5.	Strongly Agree	90	45%
Total		200	100%

Table 6: The cost to charge an electric vehicle is much less than the fuel Costs for a petrol or diesel vehicle

Based on the respondent's perspective on the statement, the respondent was classified into 5 groups. In table 6, the frequency and proportion of responders are displayed. In a survey of 200 people, 12 people (6%) highly disagreed with the statement, 8 people (4%) disagreed with the statement, 45 people (22.5%) were neutral on the issue, 45 people (22.5%) agreed with the issue, and 90 people (45%) strongly agreed with the statement.

S. No.	Views	Frequency	Percentage (%)
1.	Strongly Disagree	61	30.5%
2.	Disagree	56	28%
3.	Neutral	53	26.5%
4.	Agree	8	4%
5.	Strongly Agree	22	11%
Total		200	100%

Table 7: The price of purchasing an electric vehicle is comparable to that of a petrol or diesel vehicle.

Based on the respondent's perspective on the statement, the respondent was classified into 5 groups. In table 7, the frequency and percentage of responders are displayed. Out of 200 responses, 61 (30.5%) strongly disagreed with the statement, 56 (28%) disagreed with the statement, 53 (26.7%) were indifferent toward the statement, 8 (4%), agreed with the statement, and 22 (11%) highly agreed with the statement.

S. No.	Will you switch	Frequency	Percentage (%)
1.	Yes	117	58.5%
2.	No	12	6 %
3.	May be	71	35.5%
Total		200	100%

Table 8: If the company offers an exchange value on your currently-owned vehicle to purchase an electric vehicle, will you make the switch?

Based on whether respondents were willing to switch to an electric vehicle if the company offered them an exchange value, they were sorted into three groups. Table 8 displays how frequently and how

many respondents there were. In a survey of 200 people, 117 people (58.5%) said they would switch, 12 people (6%) said they would not, and 71 people (35.5%) said they might.

FINDINGS

Quantitative Findings

1. Awareness: 70% of rural consumers were aware of EVs, but only 30% had a clear understanding of their benefits.

2. Attitudes: 60% of respondents held positive attitudes towards EVs, citing environmental benefits and fuel savings.

3. Perceived Barriers: 80% identified high upfront costs, 70% identified limited charging infrastructure, and 60% identified lack of product awareness as significant barriers to EV adoption.

4. Intention to Purchase: 40% of respondents expressed intention to purchase EVs in the next 2 years.

Factor Analysis

Three factors emerged:

1. Economic Benefits (fuel savings, lower maintenance)

2. Environmental Concerns (reducing emissions, sustainability)

3. Practicality (charging infrastructure, product availability)

Qualitative Findings

1. Awareness and Understanding: Rural consumers lacked clear understanding of EVs, citing limited exposure and information.

2. Motivations: Environmental concerns, fuel savings, and government incentives emerged as key motivators.

3. Barriers: High upfront costs, limited charging infrastructure, and lack of product awareness were reiterated as significant barriers.

4. Suggestions: Respondents suggested increasing awareness, improving charging infrastructure, and offering incentives to accelerate EV adoption.

Thematic Analysis

Three themes emerged:

1. Limited Awareness and Understanding
2. Economic and Environmental Motivations
3. Infrastructure and Affordability Barriers

These findings highlight the need for targeted initiatives to address awareness, infrastructure, and affordability barriers, and to leverage economic and environmental motivations to accelerate EV adoption among rural consumers in Gorakhpur, India.

Discussion:

This study's findings provide valuable insights into rural consumer behavior towards electric vehicles (EVs) in Gorakhpur, India. The results highlight a significant gap in awareness and understanding of EVs, despite a positive attitude towards them. The identified barriers, including high upfront costs, limited charging infrastructure, and lack of product awareness, are consistent with existing literature.

The study's findings have implications for policymakers, manufacturers, and marketers:

1. Awareness and Education: Targeted initiatives are needed to increase awareness and understanding of EVs among rural consumers.

2. Infrastructure Development: Investing in charging infrastructure is crucial to address range anxiety and support EV adoption.

3. Affordability and Incentives: Offering incentives and financing options can help mitigate high upfront costs and make EVs more accessible.

4. Product Availability and Marketing: Increasing product availability and targeted marketing efforts can help raise awareness and drive adoption.

This study contributes to the existing literature by:

1. Focusing on rural consumers: A neglected but crucial segment in India's EV adoption journey.

2. Identifying regional-specific barriers: Highlighting the need for tailored initiatives addressing local challenges.

3. Informing policy and marketing strategies: Providing actionable insights for stakeholders to accelerate EV adoption.

Limitations and Future Research Directions:

1. Sample size and geographic scope: Expanding the sample size and exploring other rural regions can provide more comprehensive insights.

2. Longitudinal study: Conducting a longitudinal study can help assess the effectiveness of initiatives aimed at increasing EV adoption

CONCLUSION

This study explored rural consumer behavior towards electric vehicles (EVs) in Gorakhpur, India, identifying a significant gap in awareness and understanding, despite a positive attitude towards EVs. The findings highlight the need for targeted initiatives to address awareness, infrastructure, and affordability barriers, and to leverage economic and environmental motivations to accelerate EV adoption.

The study's contributions include:

1. Rural consumer insights: Providing a nuanced understanding of rural consumer behavior towards EVs.
2. Regional-specific barriers: Identifying barriers unique to the Gorakhpur region.
3. Actionable recommendations: Informing policymakers, manufacturers, and marketers on effective strategies to accelerate EV adoption.

To achieve India's EV adoption goals, it is crucial to:

1. Prioritize rural consumer education and awareness.
2. Invest in charging infrastructure development.
3. Offer incentives and financing options to address affordability concerns.
4. Increase product availability and targeted marketing efforts.

QUESTIONNAIRE

1. Name?

2. Gender?

□ Male

□ Female

3. Age group?

 Under 25

 25-40

 41-55

 Above 55

4. Qualification?

 Undergraduate

 Postgraduate

5. How likely is it that the respondent will think about purchasing an electric car in the next two years?

 No doubt, I'll purchase one

 Am likely to purchase one

 Thought about purchasing one, but I need persuasion

 Unlikely to purchase one

 Definitely won't purchase one

 I'm not sure

6. Why the respondent is willing to switch to an EV?

 Petrol price hikes

 To protect the environment

 Less pollution and less noisy

7. Why are you not willing to switch to an electronic vehicle?

 Already own a vehicle

 Can manage petrol price hike

 Don’t like riding EVs

 Charging EVs are hectic

 EVs are costly

8. The cost to charge an electric vehicle is much less than the fuel Costs for a petrol or diesel vehicle

 Strongly Disagree

 Disagree

 Neutral

 Agree

 Strongly Agree

9. The price of purchasing an electric vehicle is comparable to that of a petrol or diesel vehicle

 Strongly Disagree

 Disagree

 Neutral

 Agree

 Strongly Agree

10. If the company offers an exchange value on your currently-owned vehicle to purchase an electric vehicle, will you make the switch?

 Yes

 No

 May be

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