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Impact of Government Policies and Incentives on Consumer Preferences for Electric Vehicles in India

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Abstract

This study delves into how government policies and incentives influence consumer preferences for electric vehicles (EVs) in India amid the global shift towards electric powertrains. It examines subsidies, tax benefits, and infrastructure investments' impact on consumer awareness, perceptions, and purchasing decisions regarding EVs. Key motivators for adoption include financial incentives, environmental benefits, and sustainable mobility trends. Conversely, barriers such as high initial costs, range anxiety, inadequate infrastructure, and technology trust issues hinder adoption. Effective dissemination of information is crucial for increasing adoption rates. The perceived value of incentives varies across consumer segments based on factors like socioeconomic status and prior exposure to EV technology. Infrastructure development, notably charging station accessibility, is vital for electric mobility. To accelerate EV adoption, policymakers must combine financial incentives with robust infrastructure and targeted consumer education. Aligning government efforts with consumer preferences can reduce emissions, decrease fossil fuel dependence, and promote sustainable transportation.

Keywords: Electric Vehicles, Battery Technology, Incentives, Infrastructure India and Sustainable Transportation

1. Introduction

Government policies and incentives wield significant influence on shaping consumer preferences for electric vehicles (EVs) in India. By offering subsidies, tax benefits, and infrastructure investments, the government aims to stimulate EV adoption and drive the transition towards sustainable mobility. These measures directly impact consumer decisions by making EVs more financially attractive compared to traditional vehicles. However, challenges such as high initial costs and range anxiety persist, underscoring the need for targeted policies that address both financial and practical concerns. Despite these hurdles, government interventions play a crucial role in raising awareness and fostering positive perceptions of EVs among consumers.

1.1"Electric Vehicle Revolution: Global and Indian Perspectives"

There will be changes in the car business, which has been around for more than 100 years. Crude oil prices have gone up, & their pollution is bad for the environment. So, people need to change how they get around. Fuel-powered cars have been the mainstay of this industry, but electric cars are slowly taking over. EVs have electric motors that power them. The power is kept on by a recharging battery or some other portable energy storage device. These cars emit fewer GHG, use less energy, and make less noise. EVs can be grouped into the following

groups:

- HEV: HEVs are cars that get their power from both gas and electricity. They have both a gas engine and an electric motor. The brakes make power that charges the battery.
- PHEV: PHEVs have bigger batteries and a smaller engine than HEVs. The batteries will be charged by either the brakes or going to an outside charging station.
- BEV: They don't have engines, instead, electric motors and batteries store power. They need to be able to plug in the battery outside. You may also hear these cars called plug-in cars, EVs, or battery electric vehicles (BEVs).

Trucks and vehicles account for 25% of worldwide greenhouse gas emissions, mostly cars. Indian emissions are 7.45%, whereas Chinese and U.S. emissions are 25.9% and 13.87%, respectively. The 2016 Clean Energy Ministerial aimed to have 30% of the global vehicle market be electric by 2030, targeting passenger cars, light vehicles, buses, and trucks at 10% each. Through broad EV adoption, India hopes to reduce emissions by 37% by 2030, saving $60 billion on oil imports and fuel dependence. Battery swapping, as tested in Israel and China, and battery rentals for affordability are being considered by the government. However, charging infrastructure and battery compatibility across vehicle models remain issues. India must switch to EVs to reduce air pollution as urbanization rises.

Figure 1 Projection of electric Vehicles (Khurana, et al., 2020)

The Indian government says that by 2030, all cars will have to be electric. A white paper from the Society of Indian Automobile Manufacturer (SIAM 2017) said that by 2047, all new cars would be electric. By 2030, they said that EVs would make up 40% of these sales. The country turned 100 years old on the same day as this important event.

1.2 EV Role in Mitigating Climate Change

Burning fossil fuels releases too much greenhouse gas (GHG). Environmentally friendly policies must be implemented immediately to reduce emissions. The International Energy Agency (IEA) set a 2 °C temperature rise limit for the world's energy system in 2015. This was then revised to 1.5 °C by 2050 (Allen et al. 2018). Consider 2 billion cars on the road in 2050, when 9.8 billion people reside on Earth. Over 90% of the world's transportation relies on oil, which uses 49% of all oil produced. Transportation uses the most energy and grows fastest. This caused 25% of energy-related greenhouse gas pollution in 2009. To rescue the world, electric automobiles are the sole solution (López et al. 2019; Martínez-Lao et al. 2017; Van Vliet et al. 2011; Smith 2010; Singh et al., 2019). EVs that don't damage the air or emit greenhouse gases may help alleviate these problems. From 1832 to 1839, Robert Anderson created the first electric vehicle (EV). Main cells were non-rechargeable

(Guarnieri 2011; Thiel et al., 2020). More variants followed, but they didn't operate well since they didn't have a charging battery or a low-power motor. Electric automobiles made up 28% of New York City's cars in 1900. Better refillable lead–acid batteries and DC motors made this practical.

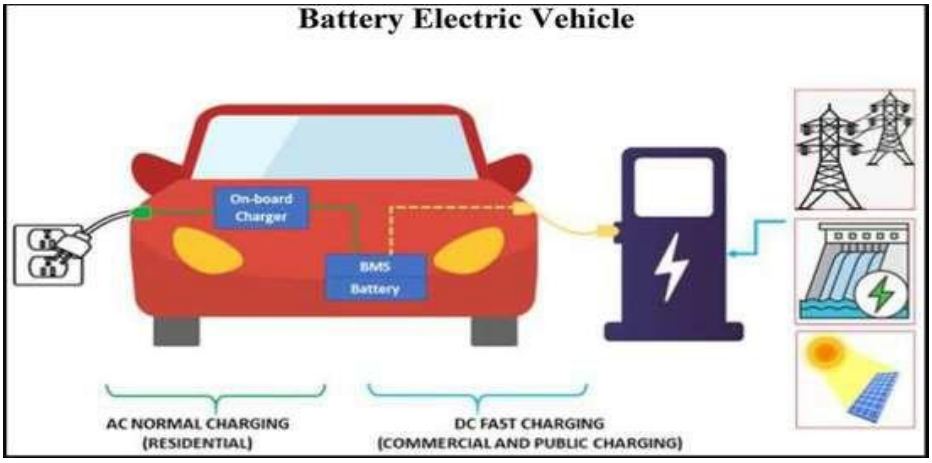

Figure2 Battery Electric Vehicle (Chan 1993)

Figure 2 depicts a battery-electric vehicle (BEV), highlighting early electric vehicle concepts. It shows how BEVs have evolved and how crucial they are to green transportation. Once fuel was available, it ceased. Because they were slow and expensive, electric automobiles (EVs) were discontinued after 1933. Air pollution from ICE cars includes carbon dioxide, carbon monoxide, hydrocarbons, and sulfur. Because they warm and pollute the Earth, these gases harm humans and the environment. We need ZEVs, or smog-free cars. ZEV comprises electric and fuel cell cars. HEVs, PHEVs, BEVs, and car-integrated EVs are also available. Only BEVs meet ZEV norms (Kempton & Letendre 1997; Browne et al., 2012). EVs are electric cars. Governments around the world are decreasing EV prices, installing charging stations, and promoting EVs to increase sales. We will examine the electric automobile (EV), its power sources (solar panels), the issues that must be addressed before more people buy them, and how EVs are doing worldwide.

1.3 Tackling CO_2 Emissions in Transport

Transportation is an intriguing and challenging aspect of business. It's crucial to use energy there. Fossil fuels, which power 95% of automobiles and trucks, cause most pollution and climate change. EEA (EEA 2019) and Fuinhas et al. (2021) suggest we must reduce transportation CO_2 emissions to stop environmental issues like temperature rising. CO_2 in the EU climbed rapidly from 1960 to 2018. Every EU citizen released 4,729.2 metric tons of CO_2 in 1960. That increased to 64,240 metric tons in 2018. Energy businesses polluted 28.0% of CO_2 in 2018. People who consumed gasoline (25.5%) and worked in transportation (24.6%) followed. Most sources' shares have fallen since 1990. However, transportation has increased from 14.8% in 1990 to 24.6% in 2018.

A quarter of EU CO_2 and GHG emissions and a third of end-use energy use come from transportation (World Bank 2022). In contrast, France has more cars. It will have twice as many autos by 2050. Nearly 60% of European passenger cars sold in 2018 were gas-powered. This implies EU transportation emits more CO_2. Italy's transportation industry released 29% more CO_2 in 2018 than in 1990 (Koengkan & Fuinhas 2021). Cars and trucks emit most EU CO_2, hence it's necessary to study ways to reduce them.

The EU wants a thriving economy and carbon-free transportation so cars don't harm the environment. Everyone in the EU wants to reduce vehicle and truck CO_2 emissions. Consider how to achieve this goal. This area's population should drop from 37.5% in 1990 to 60% by 2050. After 2050, the EU will ban internal combustion engine cars in cities. More EVs on the road can help accomplish these aims (European Commission 2019). EVs include many types of electric cars. Battery-electric vehicles have only a battery and motor. Often, the battery

needs charging. BEVs operate on 80% of their battery energy. The electric motor works well. In addition, they convert stopping energy into kinetic energy, which is wasted as heat in ICEVs (EEA 2021). Used, these cars don't harm the environment. Reusable energy sources are better for the environment. Due to their electric nature, these cars have limited range and rare mineral batteries. Charges take a long time. El Pero et al. (2018) and Robinius et al. (2018) concluded that BEVs could help the transportation industry reduce carbon emissions, one of its key goals.

A PHEV uses an electric motor with a gasoline engine. An adapter charges the battery, and the gas engine revs when the electric motor requires more power. The EU could use less fossil fuels, pollute less CO2, and increase energy security with PHEVs. PHEVs may run on electricity instead of fossil fuels due to their batteries (Shiau et al. 2010).

BEVs save more CO2 than PHEVs since they just utilize energy (Plötz et al. 2017; Mandev et al., 2021). They can significantly reduce automobile and truck CO2 emissions. Plötz et al. (2017) claim that PHEVs reduce CO2 emissions by 50–80% and BEVs by 90%. BEVs are more environmentally harmful than PHEVs due to their production. BEVs emit less CO2 than PHEVs. Because of this, BEVs emit 1.4 tons more CO2 than PHEVs. Bugs occur in battery electric autos. Countries don't have enough minerals to create batteries, thus everyone needs more. The auto industry should prioritize low-carbon battery production. Renewable energy should be the government's priority (Mandev et al., 2021).

The first electric automobile debuted in 1834. The first fuel-burning car debuted in 1886. By 1908, combustion engine cars dominated the market due to its small size, high speed, and other features. However, these autos had many issues. They were loud and used polluting fuels (Zackrisson et al., 2010). In the 1990s, climate regulations brought EVs back to many European frequency lines (Andersson & Börjesson 2021). BEVs were popular in Europe when EVs debuted. Europe acquired 700 BEVs in 2010. About 550,000 will be purchased by 2019. PHEVs have been around since 2011, but popularity has grown since 2013. In 2019, 2% of new automobiles were BEVs and 1% PHEVs. Only 3.5% of European cars are electric (Helmers & Marx 2012).

Research Questions

1. How do government policies and incentives influence consumer awareness and understanding of electric vehicle adoption in India?
2. What is the perceived value of government incentives and subsidies among Indian consumers in shaping their attitudes towards electric vehicle adoption?
3. What are the key barriers and enablers identified by Indian consumers that influence their preferences for electric vehicles, and how do government policies interact with these factors?

These research questions aim to explore the mechanisms through which government interventions affect consumer preferences for electric vehicles in India, shedding light on the role of awareness, perceived value, and barriers/enablers in driving or hindering EV adoption in the country.

2. Literature Review

The literature on the impact of government policies and incentives on consumer preferences for electric vehicles (EVs) in India offers valuable insights into the dynamics driving the adoption of sustainable transportation solutions. Several studies have examined the role of various factors, including behavioral reasoning, pricing sensitivity, and regulatory frameworks, in influencing consumer attitudes and intentions towards EVs.

(Yadav & Yadav 2024) Behavioral Reasoning Theory (BRT) was used to explore how Indian customers' values, attitudes, and reasoning affect their willingness to acquire electric vehicles (EVs). The factors that influence electric vehicle purchases were also examined. Both halves of this investigation used different approaches. First, 18 persons were interviewed about the advantages and cons of EVs using a qualitative survey. Second step, a study form filled out by 338 persons, was guided by first step's lessons. The qualitative analysis identified "reason for" (subsidies, environmental self-image, trend, and environmental worry) and "reason against" (trust issues, lack of infrastructure, range anxiety, and high initial cost) for EV adoption. The study demonstrated that personal and social attitudes strongly influenced how people felt and thought about buying electric cars. Knowing more about

the environment also weakened the attitude-intention link. BRT helped the study integrate barriers, motivators, and values into a unified framework. Businesses can utilize the data to accelerate EV adoption in India.

Kumar et al. (2024) examined Indian customers' EV purchase intentions using a two-stage integrated choice and latent variable model. Purchase decisions were impacted more by EV expenses than annual savings, and social influence rather than risk tolerance led people to acquire EVs. Based on charging station access, car usage, and income, "conservative," "indifferent," and "enthusiast" consumers emerged. EVs were more popular among younger, former automobile owners in charging station-rich areas. Policymakers can use the study to boost EV adoption.

(Bhat & Verma 2024) researched to use discrete choice models to look at the things that make people accept electric two-wheelers. The goal was to make them more popular in India. The study looked at information from 1375 people in Bengaluru, India, who might buy an electric two-wheeler. People's plans to buy electric two-wheelers were looked at in terms of their price, running costs, charging time, driving range, charging infrastructure and pollution from the vehicles' exhaust. People who own electric two-wheelers don't have to pay tolls, can use priority lanes, and can park for free. Revision also looked at and talked about the effects of these important policies. The education not only looked at the features of the bikes, but also how people's personality, travel habits, and attitudes, such as how excited they are about the environment, technology, and how they see their own social image, affect their choice to buy an electric two-wheeler. The price, how much it cost to run, and how long it took to charge were all big reasons why people didn't want to buy electric two-wheelers. However, the driving range and the depth of the charging infrastructure network made things a lot better.

(Sagar & Upadhyay 2024) examined IGI Global says that the writers came up with a way to look at how Indian government rules affect electric cars and the infrastructure that supports them. For the real-world test, data from 101 people were used. It was done with the JASP 0.17.2.1 (Apple Silicon) software package, which does principal component analysis and mediation analysis. It looked like government rules about making electric cars, standards and specs for EVs and EV batteries, as well as subsidies and benefits from the federal and state governments, all worked together to make things better. To put it another way, tight government rules about infrastructure could slow down or stop the bad effects that could happen because of EVs' heavy infrastructure. The training talked about what the results mean in terms of theory and practice.

(Ahmad & Rahul 2024) investigated that India needs more focused policies to get more people to buy EVs since the current ones don't work very well at getting people to buy them. Giving information about electric cars (EVs) to consumer groups in a developing frequency setting was used in this study as a single-arm information intervention. With the help of three hidden psychological factors, Gaussian Mixed Modeling Clustering was used to set the sample into four groups. Before the change, people in clusters with higher pro-environmental values were more likely to want to buy something. Laws that try to get people who care about the environment to buy EVs are more likely to work. The fallouts showed that these kinds of efforts would work better with groups of people who don't care a lot about the environment. People said that the right steps should be taken in each area. When making new EV policies or updating old ones, businesses and governments could look at the types of customers who were more likely to buy before the action.

(Qadir et al. 2024) conducted considering the net-zero standards, managing sustainable transportation was seen as one of the most important things for the economic and social growth of a country or area. EVs were seen as a keyway to help the world reach its net-zero pollution goals. First needed to have their issues fixed so that more people would use them. Several groups were made from these problems, such as infrastructure, adoption, costs, the energy shift, public knowledge, and market issues. Strong rulemaking and reward policies had to be put in place to solve most of these issues. Incentives, both financial and non-financial, that would get a lot of people to switch to EVs had to be part of these frameworks for EV adoption to grow quickly and consistently. The study found some barriers that haven't been talked about much in the research literature. It also stressed the need for non-fiscal incentives to get people to buy electric vehicles (EVs). Finally, it gave a thorough analysis of different incentive policies along with a detailed plan for how they should be put into action. Researchers from universities, engineering firms, government agencies, and the auto industry used the implementation framework to come up with ways to make it easy for more people to buy electric vehicles (EVs).

(Chawla et al. 2023) research looked at how people's knowledge about the environment changes how they feel

about electric cars (EVs) and how they use them. It looked at how people's views on EVs are changing from "traditionally perceived usefulness" to "green perceived usefulness." The point of this revision was to find out how people feel about cars that drive themselves and gadgets that keep track of cars. It creates learning why people were open to new technology and came up with some ways to help EVs spread around the world. Factor analysis was used to look at six different factors: charging time, innovation, perceived quality, perceived affordability, awareness, and comfort. Consumer acceptance, power economy, and customer loyalty were some of the factors that didn't have a big impact on the results. There was a big change in how people acted when it came to buying EVs because of these things.

Table 1 Key Findings and Limitations of Studies on EV Adoption in India

Author(s) Year	Key Findings	Limitations
Yadav, R., et al. 2024	Identified motivators and barriers associated with EV adoption among Indian consumers.	Small sample size for qualitative phase (18 respondents).
Kumar, R. R., et al. 2024	When people think about buying an EV, they value the purchase price more than the annual saves.	Limited geographical scope to Indian consumers.
Bhat, F. A., et al. 2024	It was found out what factors affect people's decisions to buy electric two-wheelers in Bengaluru, India.	Potential self-reporting bias in data collection.
Sagar, S., et al. 2024	Researchers looked into how government rules affect EVs and facilities in India.	Relatively small sample size (101 respondents).
Ahmad, H., et al. 2024	looked into how giving information affects the adoption of EVs among buyer groups.	Limited to a single-arm information intervention design.
Qadir, S. A., et al. 2024	emphasized how important it is to deal with problems in sustainable transportation and encourage the use of electric vehicles (EVs) by putting in place strong regulatory systems.	No specific limitations mentioned.
Chawla, U., et al. 2023	looked into how environmental knowledge affects the acceptance and use of electric vehicles (EVs) and found the most important factors that affect how people act toward EVs.	Limited to a single study context (Indian consumers).

An overview of the key conclusions and constraints from recent research examining the adoption of electric vehicles (EVs) in India is given in Table 1. While recognizing its limits in terms of sample sizes and study scopes, it provides important insights into the elements influencing customer behavior towards electric vehicles.

3. Research Methodology

It includes the theories that lead the research process as well as the tools, methods, and processes that are used to gather data and figure out what it all means. A good research technique makes sure that the study is done in a thorough and reliable way. This lets the researchers come up with valid results and add to the body of knowledge in the field. It often includes steps like reading the research, planning for the study, gathering data, analyzing that data, and finding out what the results mean. Any kind of research question, any study's goals, and any tools that are handy can lead to a different research method. Quantitative methods are things like tests and polls, and qualitative methods are things like interviews and observations. Mixed-method approaches use both types of methods.

3.1 Objectives of the study

Objectives of the study are as follows:
1. Assess Awareness Level:
Objective: Determine the level of awareness among consumers regarding existing government policies and incentives for electric vehicles in India.
2. Evaluate Perceived Value:
Objective: Evaluate the perceived value of government policies and incentives in influencing consumer attitudes and preferences towards electric vehicles.
3. Identify Barriers and Enablers:
Objective: Identify the key barriers and enablers that influence consumer decision-making regarding electric vehicle adoption, with a focus on the role of government policies.
These objectives are designed to provide actionable insights into the effectiveness of government policies and incentives in shaping consumer preferences for electric vehicles in India, with achievable research methods that can be implemented within a reasonable timeframe.

3.2 Hypothesis on impact of government policies and incentives on consumer preferences for electric vehicles (EVs) in India:

1. Hypothesis 1: Awareness of Government Policies Positively Influences Consumer Preferences for Electric Vehicles
Null Hypothesis (H0): There is no significant relationship between consumer awareness of government policies and incentives for EVs and their preferences for electric vehicles.

2. Hypothesis 2: Perceived Value of Government Incentives Affects Consumer Attitudes Towards Electric Vehicle Adoption
Null Hypothesis (H0): There is no significant relationship between the perceived value of government incentives for EVs and consumer attitudes towards electric vehicle adoption.

3. Hypothesis 3: Barriers and Enablers Identified by Consumers Impact Electric Vehicle Preference

Null Hypothesis (H0): There is no significant relationship between the barriers and enablers identified by consumers and their preferences for electric vehicles.
These hypotheses provide a framework for testing the relationships between key variables, including consumer awareness of policies, perceived value of incentives, and identified barriers and enablers, and their impact on consumer preferences for electric vehicles in the context of government interventions in India.

3.3 Research Design A mix of methods is used to investigate how government policies and incentives affect Indian customers' decisions about which electric vehicles (EVs) to buy. This study incorporates both quantitative surveys and qualitative conversations. To gather information from Indian customers aged 18 and up in both urban and rural areas during the quantitative phase, a technique known as "simple random sampling" is employed. Participants are asked to fill out a structured questionnaire online, covering topics such as their knowledge of government policies, perceptions of incentives, attitudes towards EVs, and socio-demographic characteristics. Both descriptive and inferential statistics are utilized to examine the relationship between variables and interpret the poll responses. In the qualitative step, in-depth interviews are conducted with a small group of survey respondents who hold different viewpoints. Thematic analysis is used to explore participants' thoughts, feelings, and experiences regarding the government's policies and rewards for EVs. The results from both stages are combined using triangulation to gain a comprehensive understanding of the study questions and to assess how the actions of the Indian government are influencing consumers' preferences for purchasing electric cars.

3.4 Collection of Data:

Data collection primarily involves gathering information from both primary and secondary sources.

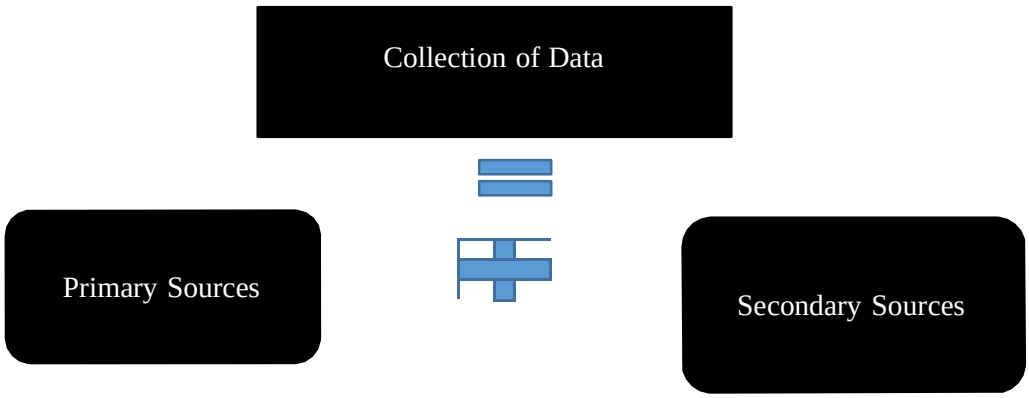

Figure 3 Collection of Data

The data gathering process for the study is shown in Figure 3. It lists the primary and secondary data sources. For primary data collection, an online questionnaire that is standardized is given, and secondary data are obtained from several web sources like ResearchGate, Research Scholar, Emerald Insight, and Wiley.

Primary Data:
In our study, we employ a standardized questionnaire to collect primary data, which is gathered directly from respondents. To facilitate this process, a Google Form is created and distributed to the target participants through online channels.

Secondary Data:

- Research Gate
- Research Scholar
- Emerald Insight
- Wiley

Table 2 Sampling Details for Study on EV Policies and Consumer Preferences in Delhi (NCR)

pulation under study	lhi (NCR)
nple size	
npling unit	nsumer
npling Technique	bability sampling

The sampling information for our investigation on EV policies and consumer preferences in Delhi (NCR) is shown in Table 2. It highlights the methods used in data collecting by providing details on the population being studied, sample size, sampling unit, and sampling procedure.

4. Results and Discussion

Table 3 Awareness of EV Policies and Incentives

Response	Frequency
Strongly Disagree	8

Disagree	8
Neutral	19
Agree	38
Strongly Agree	27

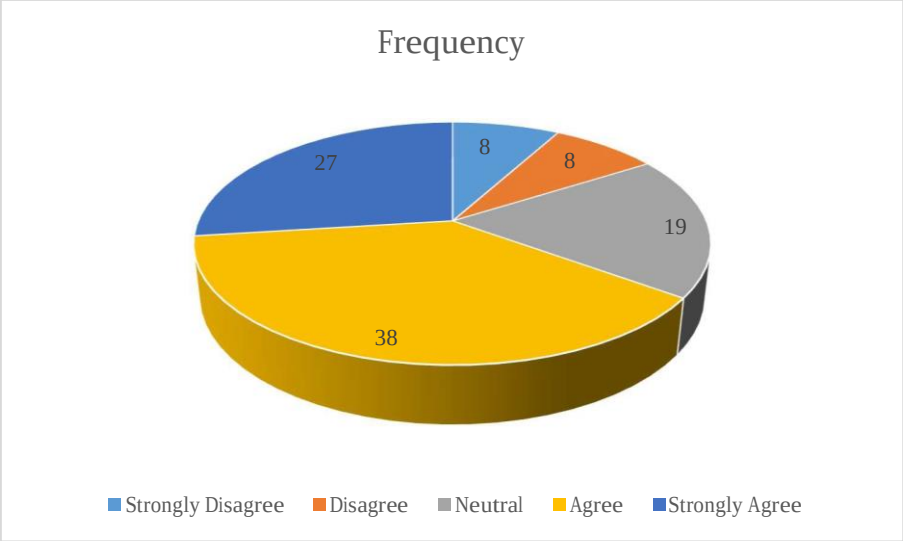

Figure 4 Awareness of EV Policies and Incentives

Figure 4 Are you aware of government policies and incentives aimed at promoting electric vehicle adoption. Based on the distribution of answers, 65 out of 100 people who answered either agree or strongly agree with the statement being evaluated. This means that most people who answered either agreed or strongly agreed with the statement. This means that most of the people surveyed had a positive mood or agreed with the statement's main idea. However, it's interesting to note that there are also a lot of vague answers, which could mean that a lot of people aren't sure what they think or feel. There are some disagree and strongly disagree responses, though they are not very common. This shows that there is also a minority view that doesn't agree with the statement. Overall, the interpretation shows several points of view, with a strong tendency toward agreement but also a wide range of views.

Table 4 Perception of Government Incentives on EV Adoption

Response	Frequency
Not valuable at all	8
Slightly valuable	15
Moderately valuable	20
Very valuable	30
Extremely valuable	27

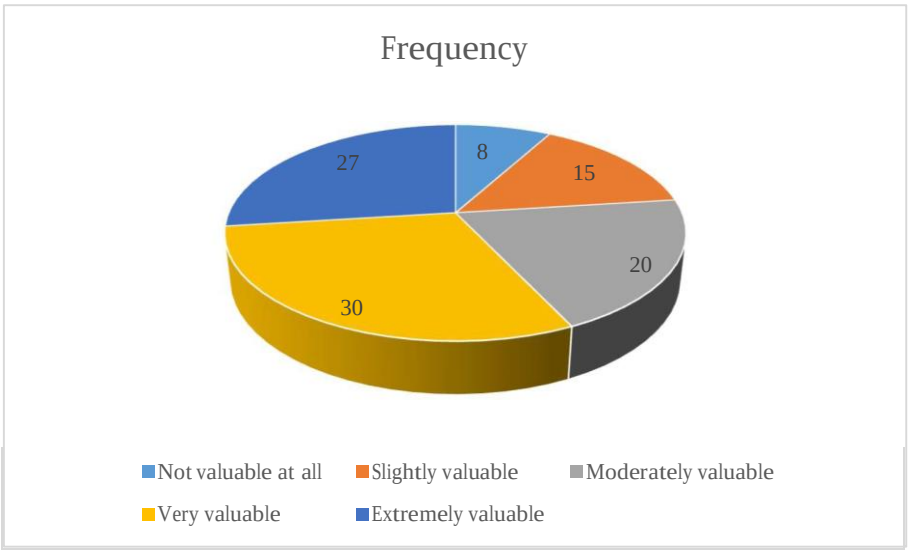

Figure 5: Perception of Government Incentives on EV Adoption

Figure 5 Do you perceive government incentives and subsidies to be in influencing your attitudes towards electric vehicle adoption. Most of the people who answered the survey thought the thing being evaluated was very valuable or extremely valuable, which is a generally positive view. In other words, this means that the thing is very important or useful to a lot of the people who answered. There is, however, a sizable part of the population that thinks it is only slightly or moderately useful, showing that there is some variation in how useful people think it is.

Table 5. Perceived Effectiveness of Government Policies on EV Incentive Awareness

Response	Frequency
Not effective at all	7
Slightly effective	12
Moderately effective	22
Very effective	30
Extremely effective	29

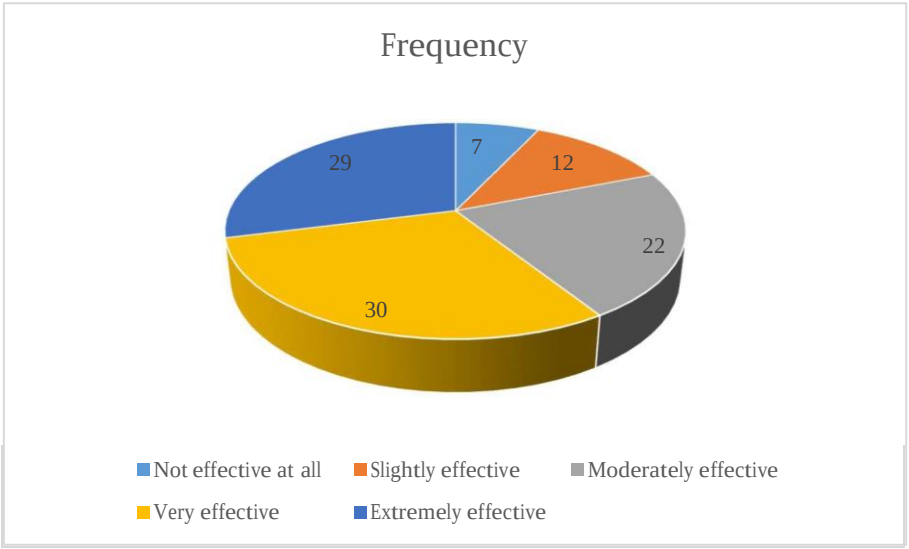

Figure 6 Do you believe government policies have been in increasing awareness of electric vehicle incentives among consumers

The perception of whether government initiatives have raised public knowledge of electric vehicle incentives is shown in Figure 6. The findings show differing viewpoints; most respondents rated these policies' effectiveness as very effective or extremely effective, while some thought they were either marginally beneficial or not at all effective. The results show that most people had a good opinion of how well the item being evaluated worked, with most rating it as very effective or extremely effective. This means that a large part of the people asked think the item had a big effect or did what it was supposed to do. There is, however, a large group of people who think it works less well, with some describing it as only slightly effective or not effective at all. This shows that people have different thoughts about how well it works.

Table 6. Do you agree that government incentives influence your decision-making process regarding electric vehicle purchase

Response	Frequency
Strongly Disagree	5
Disagree	10
Neutral	20
Agree	35
Strongly Agree	30

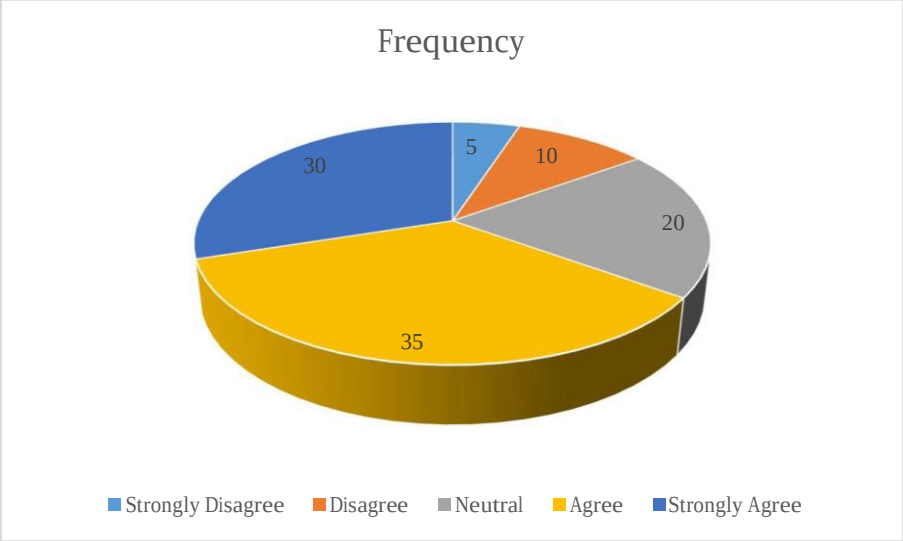

Figure 7 Do you agree that government incentives influence your decision-making process regarding electric vehicle purchase

The consensus on how government incentives affect consumers' decision-making when it comes to buying electric vehicles is seen in Figure 7. Most respondents indicated a high degree of agreement with the statement, either strongly agreeing with it or agreeing with it. A total of 65 out of 100 people fell into these two groups. This shows that a lot of people agree with the statement's main idea. However, it's interesting to note that there are also a lot of neutral responses, which means that a lot of people don't highly agree or disagree. Some people disagree or strongly disagree, but they only make up a small part of the total answers. Overall, the reading shows a leaning toward agreement, with some neutral points of view standing out.

Table 7. Do you rely on government sources for information about electric vehicle policies and incentive

Response	Frequency
Never	12
Rarely	18
Occasionally	25
Often	30
Always	15

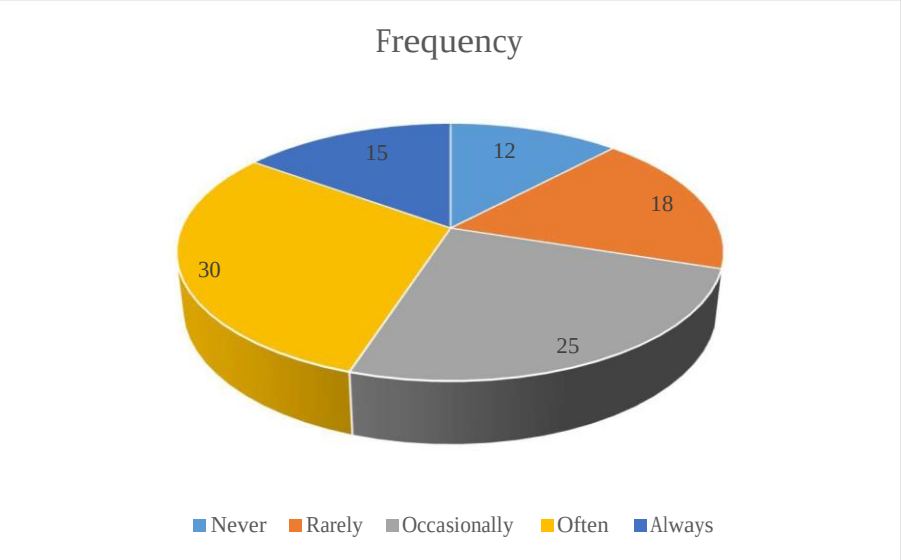

Figure 8 Do you rely on government sources for information about electric vehicle policies and incentives
The reliance on official sources for information regarding policies and incentives pertaining to electric vehicles is illustrated in Figure 8. Different levels of dependence are indicated by the frequency distribution, where "Often" is the most frequently given response, followed by "Rarely" and "Occasionally." The frequency distribution indicates varying degrees of occurrence regarding the behavior or phenomenon being assessed. "Often" received the highest frequency, suggesting that a substantial portion of respondents experience the behavior or phenomenon frequently. However, it's noteworthy that there are also significant frequencies for "Rarely" and "Occasionally," indicating a range of occurrences among respondents. "Never" and "Always" received lower frequencies, suggesting that extreme occurrences are less common among the surveyed population. Overall, the interpretation suggests a diverse range of experiences with the behavior or phenomenon, with a tendency towards occasional or frequent occurrences. Table 8. The overall effectiveness of government policies in promoting electric vehicle adoption, considering your socio-demographic background

Response	Frequency
Very Ineffective	5
Ineffective	10
Neutral	18
Effective	32
Very Effective	35

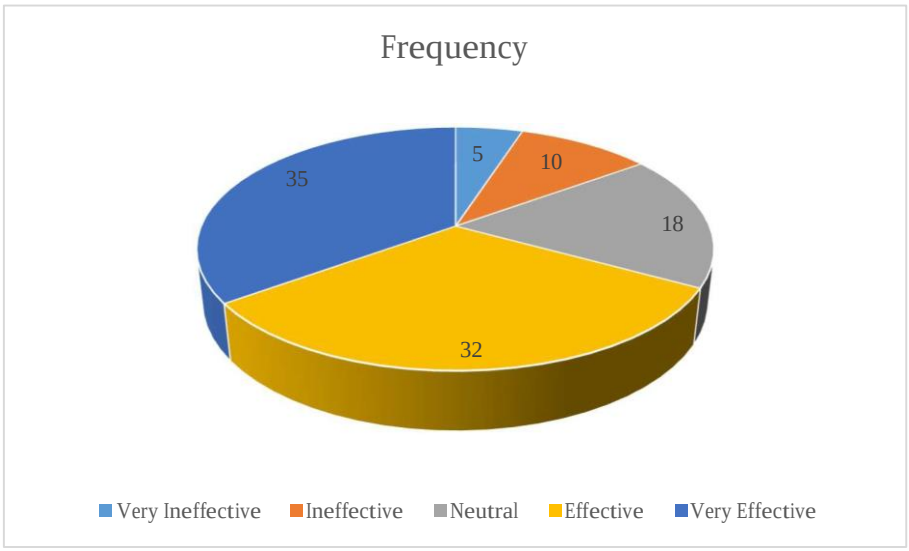

Figure 9 The overall effectiveness of government policies in promoting electric vehicle adoption, considering your socio-demographic background

Considering the sociodemographic backgrounds of the respondents, Figure 9 shows the overall efficacy of government initiatives in encouraging the adoption of electric vehicles. While some respondents thought these initiatives were useless, most respondents evaluated them as effective or very effective. The frequency distribution suggests a generally positive perception of effectiveness regarding the item being assessed, with most respondents rating it as effective or very effective. This indicates that a significant portion of the surveyed population views the item as having a positive impact or being successful in achieving its intended purpose. However, it's notable that there are also respondents who perceive it as ineffective, with a smaller portion rating it as very ineffective or ineffective. The presence of neutral responses suggests some uncertainty or variability in opinions among respondents. Overall, the interpretation suggests a predominance of positive perceptions of effectiveness, with some diversity in opinions.

Table 9. Do government incentives address your concerns and priorities in transitioning to electric vehicles

Response	Frequency
Not at all	10
To a small extent	15
To a moderate extent	20
To a large extent	30
Completely	25

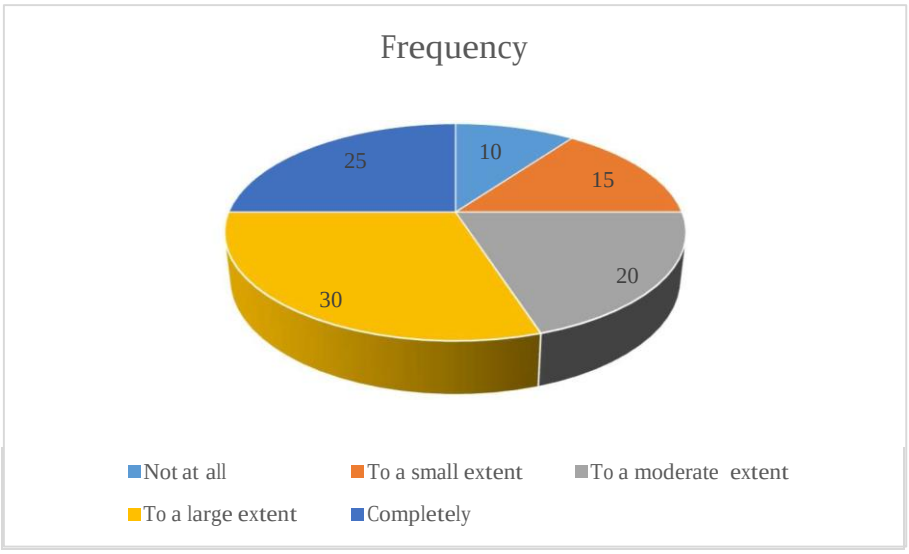

Figure 10 Do government incentives address your concerns and priorities in transitioning to electric vehicles

The degree to which government incentives satisfy respondents' goals and concerns in making the switch to electric vehicles is depicted in Figure 10. The replies "Completely" and "To a large extent" were the most frequently given, suggesting a major influence. The frequency distribution indicates varying degrees of extent regarding the phenomenon or action being assessed. "To a large extent" received the highest frequency, suggesting that a substantial portion of respondents experience the phenomenon or action to a significant degree. Following closely is "Completely," indicating that many respondents experience the phenomenon or action in its entirety. "To a moderate extent" and "To a small extent" received moderate frequencies, suggesting that a considerable portion of respondents experience the phenomenon or action to varying degrees but not as intensely. "Not at all" received the lowest frequency, indicating that few respondents do not experience the phenomenon or action at all. Overall, the interpretation suggests a diverse range of experiences with the phenomenon or action, with a tendency towards moderate to large extents.

Table 10. Are you in the reliability and consistency of government policies related to electric vehicles

Response	Frequency
Not confident at all	8
Slightly confident	15
Moderately confident	25
Very confident	30
Completely confident	22

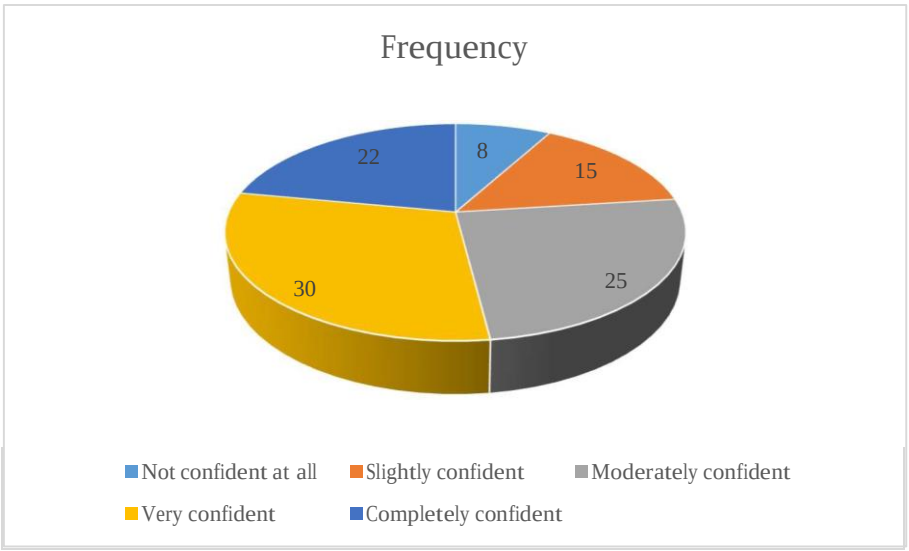

Figure 11 Are you in the reliability and consistency of government policies related to electric vehicles

The respondents' trust in the dependability and coherence of governmental regulations pertaining to electric vehicles is depicted in Figure 11. "Very confident" was the most often given response, indicating that respondents had a high degree of confidence. The frequency distribution suggests varying levels of confidence among respondents regarding the subject in question. "Very confident" received the highest frequency, indicating that a significant portion of respondents feel highly assured about the subject. "Moderately confident" follows closely, suggesting that many respondents feel reasonably sure but not as strongly as those who are very confident. "Completely confident" and "Slightly confident" received moderate frequencies, indicating differing levels of certainty among respondents. "Not confident at all" received the lowest frequency, suggesting that few respondents lack confidence entirely. Overall, the interpretation suggests a range of confidence levels among respondents, with a notable portion feeling at least moderately confident.

Table 11. Are you to invest in an electric vehicle based on your perception of government incentives

Response	Frequency
Very Unlikely	5
Unlikely	10
Neutral	20
Likely	35
Very Likely	30

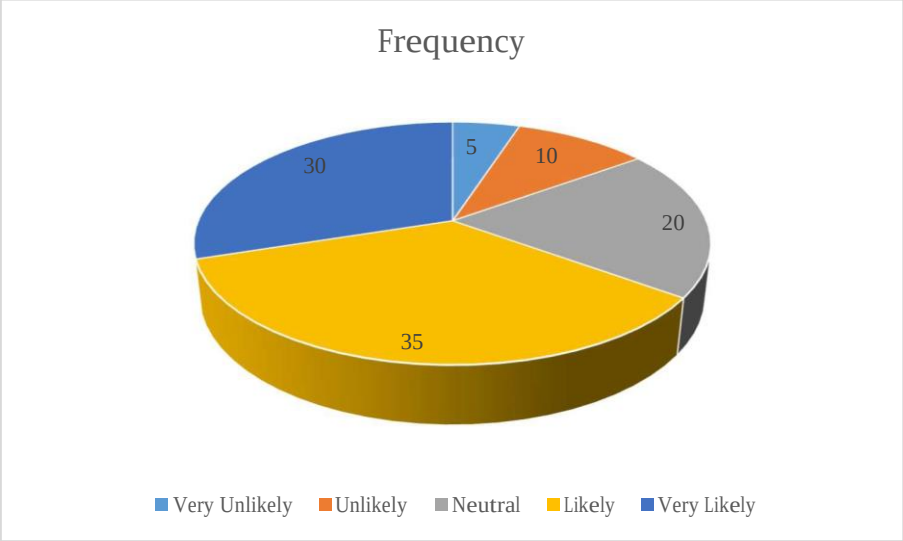

Figure 12 Are you to invest in an electric vehicle based on your perception of government incentives

Based on how respondents felt about government subsidies, Figure 12 shows how likely they were to purchase an electric car. The most often given answers were "Likely" and "Very Likely," suggesting that incentives were seen favorably. The frequency distribution shows that respondents had different levels of confidence in the event or case in question. The most common answers were "Likely" and "Very Likely," which means that a lot of people think the event or situation is likely to happen or very likely to happen. "Neutral" came up a moderate number of times, which means that respondents were unsure or neutral. The words "Unlikely" and "Very Unlikely" were used less often, which means that fewer people think the event or situation is unlikely or very unlikely. Overall, the reading shows that respondents had different ideas about how likely something was to happen, but most of them believed it would happen.

Table 12. The importance of government policies for electric vehicles compared to alternative transportation options

Response	Frequency
Not important at all	7
Slightly important	12
Moderately important	20
Very important	32
Extremely important	29

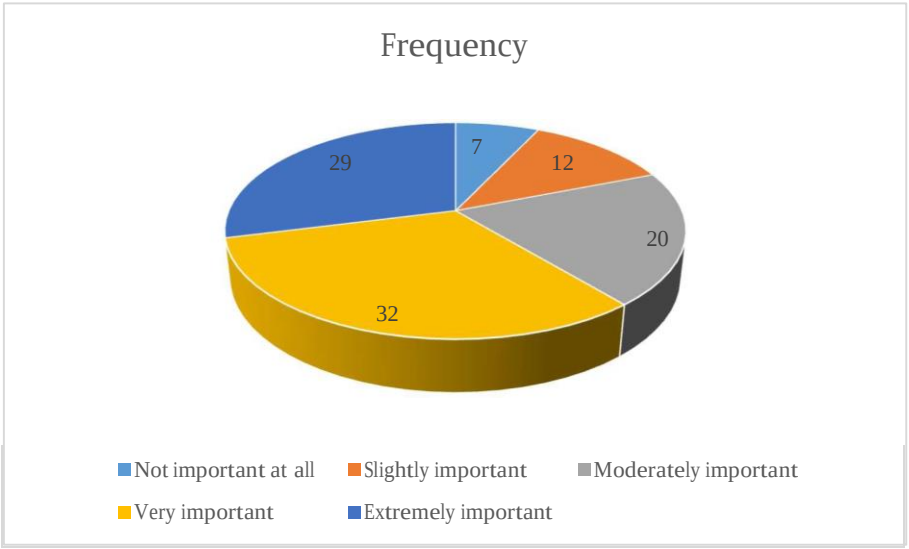

Figure 13 The importance of government policies for electric vehicles compared to alternative transportation options

The significance of government initiatives for electric vehicles in relation to other modes of transportation is depicted in Figure 13. Government policies are significant, as evidenced by most respondents rating them as very important or extremely important. The frequency distribution suggests varying levels of importance attributed to the subject in question among respondents. "Very important" received the highest frequency, indicating that a significant portion of respondents consider the subject highly significant. "Extremely important" follows closely, suggesting that many respondents regard the subject with utmost importance. "Moderately important" received a moderate frequency, indicating a considerable portion of respondents view the subject with some level of significance, though not as strongly as those who find it very or extremely important. "Slightly important" and "Not important at all" received lower frequencies, suggesting that fewer respondents perceive the subject as having minimal importance. Overall, the interpretation suggests a range of importance levels among respondents, with a tendency towards considering the subject at least moderately important.

4.1 Discussion

The analysis of the ten tables gives a full picture of how respondents felt about government policies and rewards meant to encourage people to buy electric vehicles (EVs). There is a more nuanced understanding of the role of government involvement in shaping the shift to electric mobility when looking at the tables' different aspects, such as awareness, perception, and influence. Table 2 shows how aware people are of policies. A lot of people say they know about them, but a lot of people aren't sure or are neutral, which shows that people have different levels of knowledge about government programs. This lack of confidence is shown even more in Table 4, where answers to the question of how valuable incentives are show a wide range, from very valuable to only slightly valuable. This shows that people have different thoughts on how well these measures work. In addition, Table 5 shows how successful policies were, showing that most people felt positively about them, with many ratings them as very or extremely effective. But the fact that some people think they're only slightly successful or not effective at all shows that people have different opinions on the subject. In Table 6, which looks at how incentives affect the decision-making process, most people agree that they do. However, the large number of neutral answers shows that people aren't sure or that the way incentives affect individual choices is complicated. Tables 7–12 also show more information about different parts of government programs and how respondents felt about them. 'often' was the most popular answer, showing a lot of trust in government channels for sharing information on EV policies (Table 7). In the meantime, Tables 8 and 9 show how successful policies were thought to be and how well they fit with respondents' concerns and priorities. The data shows that people have a mixed but mostly positive view, with a large part agreeing that the policies meet their needs. Table 10 also shows how confident respondents were

in the stability and dependability of government policies. The confidence levels ranged from "not confident at all" to "completely confident," showing different levels of trust in how policies were implemented and enforced. Lastly, Table 11 looks at how likely respondents were to buy an EV based on how they saw government incentives. This shows that a lot of people think incentives can affect people's choices to adopt new technologies. The data suggests that there is a complicated link between what the government does and how people feel about buying electric vehicles. There is a general agreement that government policies and incentives can help more people buy electric vehicles (EVs), but there is also some uncertainty and a range of views. These results make it clear that policy implementation and communication strategies need to be constantly reviewed and improved to successfully address public concerns and speed up the move toward a more sustainable transportation ecosystem.

5. Conclusion

From the study's results, it's clear that the people who answered it really understand how important it is for the government to keep EVs on the road. Many of the people who answered said these rules were very important to them. This shows how important it is for the government to keep working on programs that help people switch to electric cars and maybe even make them better. People are becoming more aware of the need to work together to protect the environment and support transportation choices that are better for the environment. It's a good sign that more people are realizing how important the government is. Also, the numbers show how well moves by the government might change people's minds, so they choose more eco-friendly ways to get around. It is very important for governments to support electric vehicles (EVs) and give incentives to people who buy them. This will help reduce greenhouse gas emissions and lessen the effects of climate change. A good view is shown by the data. This means that strong policy support can make a big difference in making the transportation ecosystem greener and more sustainable, which will help people now and in the future.

The fact that people gave positive answers to the question of how important government policies are shows that they are open to EVs as an alternative to gas-powered cars. People are becoming more eco-friendly, and more people know how important it is to switch to better and more sustainable forms of transportation right away. The numbers also show how important it is for the government to encourage new ideas and put money into EV facilities, which helps a lot of people use them. In the end, the results show how important it is for the government to have policies that encourage the switch to electric cars and help reach larger sustainability goals. As long as governments keep putting money and effort into policies that help EVs, more people will buy them. This will also help make the transportation system more sustainable and reliable. There is strong proof in the data that the government can change people's behavior and lead society to a cleaner and greener future.

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The author declares that there is no competing interest.
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Not applicable.

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