HỘI DOANH NGHIỆP HÀNG VIỆT NAM CHẤT LƯỢNG CAO
CLIMATE PROMISE
UNDP

REPORT

MARKET SURVEY OF E-VEHICLE TARGET GROUPS

Hồ Chí Minh City, March 2023

HOST UNIT

United Nations Development Programme

EXECUTION UNIT

Business Association of High-quality Vietnamese Products

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LIST OF ABBREVIATIONS

Vehicles	**VEH**
Electric vehicles	**EVs**
Business	**BSN**
Viet Nam Association of Motorbike Manufacturer	**VAMM**
Ministry of Natural Resources and Environment	**MONRE**
Ministry of Transport	**MOT**
United Nations Development Programme	**UNDP**
Business Association of High-Quality Vietnamese Products	**BAHQVP**

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REPORT SUMMARY

The national market surveys of target groups about electric vehicle (EVs) including consumer needs and quality expectations, knowledge about basic operations and maintenance of EV as well as consumer behaviour towards EVs was conducted by United Nations Development Programme (UNDP) in collaboration with Business Association of High-Quality Vietnamese Products (BAHQVP) with main purposes to find out the perception, current and forecasted demand, usage status, purchase intentions and forecast the EVs market trends and propose policy recommendations to support the production or promote EVs adoption. Two survey approaches were employed, includes a nationwide online survey and an offline survey. The offline survey has been conducted at five major municipalities - Hanoi, Hai Phong, Da Nang, Ho Chi Minh City, and Can Tho and three provinces implementing pilot activities to promote the use of EVs: Quang Ninh, Thua Thien Hue, and Phu Yen. In total, 1,427 survey responses were collected, of which 1,283 were deemed valid and 144 were invalid. Among the 1,283 valid responses, 785 consumers (55 percent) reported having previous experience using EVs. Meanwhile, 498 potential consumers (35 percent) indicated they had not used EVs previously but expressed interest in them. Approximately 83% (1,215 respondents) answered the survey online, while the remaining 17% (215 respondents) completed the offline survey.

Key findings

- EV ownership has grown in recent years but remains modest, with electric motorbikes representing 34% of vehicle-owning households surveyed.

- Two-wheeled EVs like e-motorbikes and bicycles have seen greater use than four-wheeled alternatives to date.

- Majority (79%) of consumers began using various EVs within past 3 years, indicating nascent but growing market.

- Daily transportation emerged as primary EV application, followed by shopping and visiting others. Limited sightseeing/travel suggests untapped potential.

- 78% of non-users expressed future EV needs, projecting expanding demand across vehicle segments overtime.

- Environmental friendliness and economic practicality rated as top EV benefits, whereas quality, design and supply ecosystems require continued progress.
- Major barriers included entrenched ICE vehicle habits, insufficient charging infrastructure and policy incentives. Intrinsic limitations like ranges and speeds also hindered broader uptake.

Based on results from surveys, some key conclusions are highlighted as follows:

- Growing EV Acceptance in Vietnam: Insights on Demand and EV development
- Growing Electric Vehicle Market Potential
- Overcoming the Technological, Infrastructural and Policy Barriers to Electric Vehicle Uptake in Vietnam

Recommendations

For manufacturers:

- Invest in technologies boosting battery performance, travel distances and speeds.
- Strengthen service ecosystems around distribution, aftersales support, and maintenance access.

For government:

- Develop charging infrastructure nationwide through public-private investments and partnerships.
- Implement preferential purchase policies like trade-in programs and preferential loans to stimulate demand.
- Enhance awareness of EV benefits through targeted communications and promotional campaigns.

Collectively addressing barriers across technical, infrastructural and policy domains hold importance to optimizing Vietnam's supportive environment for further mainstreaming sustainable electric mobility over the coming decade.

PART ONE:

GENERAL INTRODUCTION AND SURVEY PLAN

1.1 INTRODUCTION TO ELECTRIC VEHICLES

1.1.1 Global development of electric vehicles

Electric vehicles (EVs) appeared in 1859 with a primitive and simple look, but this marked an important milestone in the development of the global EV market. Throughout its formation and development, the EV market has gone through many important milestones, including:

- In 1859, French physicist Gaston Planté successfully invented a rechargeable battery that could store energy for EVs.
- In 1880, French inventor and electrical engineer Gustave Trouvé attached a rechargeable battery to a tricycle and created history with the world's first EV.
- In 1884, in the United Kingdom, inventor Thomas Parker successfully built the world's first electric car.
- In 1890-1891, inventor William Morrison was the first person to create an EV in the United States. The car had a top speed of 23 kilometres per hour (km/h) and could seat six people.
- In 1897, engineer Walter Bersey created a fleet of electric taxis operating in London, England. Also in 1897, electric taxis were developed in New York, USA.
- In 1912, many families around the world began to prefer using EVs. In the US alone, there were 33,842 EVs at this time.
- In the 1920s, Ford (USA) researched and produced internal combustion engine (ICE) vehicles that ran on gasoline and sold them at a low price, which had a strong impact on the EV market. Gasoline was no longer too expensive, gas stations were built everywhere and gasoline vehicles became more popular than EVs.

Given rising environmental and noise pollution concerns with fossil fuel vehicles, countries are encouraging the transition to green energy-powered transport. The global auto market is increasingly shifting towards EVs, as manufacturers recognize their technical superiority over ICE vehicles in areas like emissions reductions and compatibility with decarbonization trends. EVs offer operational advantages around fuel costs and environmental friendliness, positioning them as the future of transportation.

According to the International Energy Agency's (IEA) 2019 report, total EV sales worldwide increased 9% to reach 1.4 million units from 2018. However, this growth rate was relatively modest compared to the 46-69% rates seen in the previous six years. EV sales declined in the two major markets of the US and China in the last six months of 2019, contributing to the slower growth. Encouragingly, EV sales grew sharply in European countries at around 44% that year.

Despite pandemic impacts, the IEA's 2020 report found that while total new car registrations did not increase significantly, EV sales worldwide still rose sharply to 2.01 million vehicles. This indicated growing consumer preference for EVs and green transportation. As a result, EVs achieved a record 4.6% share of the global auto market in 2020. By 2021, global EV sales had further increased to reach 4.2 million units, demonstrating unexpected sales growth as automakers increasingly moved towards electrification.

The electricity transmission and EV markets continued rapid development in 2022. To meet rising demand, some car brands began requiring customer deposits ahead of EV purchases. A few popular models quickly sold out for the next two years. Projections show EVs will completely dominate the global automotive market within the next decade versus ICE vehicles, reflecting ongoing steady growth in the global EV sector.

Facing strong market growth, raw materials critical to EV battery production like lithium, lead, zinc, cobalt and nickel are becoming increasingly scarce. Mining also causes problems such as skills mismatches, job displacement, environmental pollution, and damaged landscapes. As a result, many brands are racing to research and develop new battery technologies supporting sustainable electric vehicle manufacturing industry growth.

1.1.2 The development of electric vehicles in Viet Nam

Some EV models have been introduced in Viet Nam as early as 2010, such as the Mitsubishi i-MiEV at the 2010 Motor Show and the Nissan Leaf at the India auto exhibition in 2012. Due to the transportation characteristics in Viet Nam, electric motorbikes and electric bicycles are popular means of transportation in urban areas. According to media reports, before 2013, imported EVs dominated the market, most smuggled. Since regulations on the technical safety quality of electric bicycles were issued according to Circular No. 39/2013/TT-BGTVT and

Circular No. 41/2013/TT-BGT-VT, the situation of smuggled EVs has been limited, and locally-produced EVs have gradually dominated the market.

According to Viet Nam Association of Motorbike Manufacturers (VAMM), the total number of electric motorbikes and electric bicycles sold in Viet Nam in 2017 reached nearly 500,000 units, an increase of 30 percent compared to 2016. In 2018, the growth rate was about 40 percent. At the end of 2018, the appearance of VinFast Klara EVs had a strong impact on the electric motorbike market in Viet Nam. According to the latest statistics from the Market Management Bureau (Ministry of Industry and Trade [MOIT]), there are over three million electric bicycles and electric motorbikes currently in circulation nationwide. Each year, Vietnamese consumers purchase about 250,000 to 300,000 EVs. This is a modest number compared to the sales of ICE motorbikes, estimated at over three million units per year.

There are three main groups participating in Vietnam's EV distribution market. The first group is imported and sold by individuals. The second comprises foreign-branded products distributed through official dealerships that provide spare parts and maintenance services. The third consists of Vietnamese products linked to foreign suppliers, also with dealer networks for spare parts and implementing warranty/maintenance policies. Examples include Anbico, Pega, nKBike, SYM, KYMCO, etc.

Vietnam's EV market is considered attractive as the number of manufacturers and assemblers rapidly increases. Data from the Vietnam Register also shows the trend of EV development versus traditional fuel vehicles. While domestically produced EVs comprise a small approximately seven percent annual share, their growth rate remains steady.

In addition, the import of electric cars by companies into Vietnam has also seen high growth. Imported electric car numbers increased approximately 500% in 2020 compared to 2019. In recent years, domestic manufacturers have participated in electric vehicle manufacturing and supply chains. A range of EVs will be introduced to the market in 2022, such as buses and sedans.

According to MOIT's report on implementing the Strategy for Developing Vietnam's EV Industry through 2025 with a vision to 2035, some car and motorbike production and import firms in Vietnam have begun experimenting with, manufacturing, and introducing environmentally friendly vehicles like hybrid cars, electric motorbikes, electric cars, and autonomous vehicles.

1.2 RESEARCH CONTEXT

According to Vietnam Register statistics, motorbike sales decreased from 3.25 million units in 2019 to 2.84 million in 2020 due to COVID-19 impacts, a 12.6% drop. Sales continued declining in 2021. However, Vietnam still maintains sales around three million units annually, which is a high consumption level compared to other regional and world countries.

Statistics from the Southeast Asian Automobile Manufacturers Association show Vietnam's automotive market grew fastest in the region over the past two years at 34%. In the first half of 2022, 201,840 cars were sold, a 34.1% rise versus the same period prior year. Among the seven countries with sales data, Vietnam ranks fourth for production and sales after Indonesia, Thailand, and Malaysia. These figures come from respective country automobile manufacturer associations and exclude non-member businesses.

According to VAMA, vehicle sales in Vietnam reached 36,560 units in October 2022 - up 9.3% from September 2022 and 22.7% over October 2021.

The rapid rise in the number of vehicles on roads not only increases fuel consumption demands but also causes greenhouse gas emissions, environmental pollution, and public health issues. Reports from the Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH (GIZ) and World Bank in 2019 found transportation a major source of increasing greenhouse gas emissions in Vietnam. Outdated infrastructure and urban planning have contributed to transportation crises causing high air pollution and congestion in Vietnam's cities.

Against this background, the government and agencies are formulating and implementing many sustainable development initiatives, including promoting the usage of EVs. On July 22, 2022, the Prime Minister issued Decision No. 876/QD-TTg approving the Action Program for Transition to Green Energy and Mitigation of Carbon Dioxide and Methane Emissions from Transportation. The program establishes a roadmap for green energy transformation in the transport sector as below:

- From 2022-2030: Setting goals to phase out production of traditional fossil fuel vehicles, to promote EV production, assembly, import and use; expanding blending and use of E5 gasoline for road transport. It also encourages developing charging infrastructure to meet people's and businesses' needs, and encouraging bus stations and rest stops to transition to green features.

- By 2040: Vietnam aims to gradually limit and phase out domestic production, assembly and import of fossil fuel vehicles.
- By 2025: All road motor vehicles are targeted to switch to electric and green energy. Concurrently, nationwide charging infrastructure will be established to provide green energy.

Green energy transition has been identified as the most fundamental and crucial task in pursuing green growth goals and fulfilling Vietnam's commitments under the COP26 Conference. It also presents an opportunity for Vietnam's transportation sector to develop synchronously towards modernization and sustainability, in alignment with global trends. While some studies have examined EV development (e.g., roadmaps and policies), more research is still needed to provide holistic solutions supporting wider EV adoption.

Recognizing the importance of understanding consumer perspectives on demand, market potential, and barriers to EV development in order to identify solutions promoting greater EV use, the United Nations Development Programme (UNDP) partnered with the High-Quality Vietnamese Business Association (AHQVGE) to implement the " National Consumer Survey on Electric Vehicles" under the framework of the project of Catalysing a Sustainable Shift towards E-mobility, which is funded by the Government of Japan. The nationwide online and offline survey aimed to understand the current situation and capture consumer demand, expectations, satisfaction levels, and limitations/barriers regarding EV selection and use. Recommendations will be proposed to promote EV adoption. Additionally, the research expects to provide insights into current disposal/battery treatment practices and consumer environmental awareness related to EVs.

Overall, the study results are anticipated to offer a new perspective and recommendations to comprehensively support increased EV usage.

1.3 MARKET SURVEY PLAN ON ELECTRIC VEHICLES

1.3.1 Survey objectives

The main objectives of market surveys of target groups about EVs including consumer needs and quality expectations, knowledge about basic operations and maintenance of EV as well as consumer behaviour towards EVs could be listed as below:

- Understand the current situation, demand, expectations, and trends of general market in electric vehicle development.
- Evaluate the satisfaction levels of EV users in terms of quality, durability, design, price, market supply, and usage time, etc.
- Identify the limitations of EVs and the barriers affecting to the EV use based on user feedback and propose solutions for improvement.
- Propose recommendations to support EV production and promotion. This includes recommending activities that require development partner support and marketing efforts to promote and increase the EV usage, and/or recommending business activities in branding and product, distribution, and promotion.
- Assessing the current situation regarding the disposal and treatment of damaged EV batteries from EV users.

1.3.2 Survey contents

The key contents of the survey are as follows:

- **General information about EV users and potential consumers**: Who are they? In which age range do they typically fall? What is their average household income level?
- **Purpose of EV use**: Going to work, going to school, leisure, or tourism, etc.
- **Demand and expectations** of EV users and potential consumers.
- **Potential and trends** for future EVs adoption.

- **Key determining criteria** for choosing to purchase an EV and the willingness to purchase or switch to an EV.

- **Limitations of EVs and barriers**: Durability (vehicle, battery), price, speed, technical infrastructure (charging stations, transportation infrastructure), safety, supply services, maintenance and repair, incentive policies, etc.

- **Evaluation of the satisfaction level of potential consumers with EV products**: quality, durability, price, speed, safety, charging time, distance travelled after each charge, product origin, brand reputation, supply services, operation services (charging stations), maintenance (repair location), economic efficiency (operating costs), environmental protection efficiency, user trust and confidence in users.

- **The current situation regarding the disposal and handling of damaged EV batteries**: exchanging old batteries for new ones, disposing of them as waste, repurposing them for other uses, etc.

1.3.3 Methodology

Study design

Quantitative approach using Face-to-face interviews with pre-designed questionnaires including mostly closed-ended questions and a few open-ended questions.

Respondents

The survey respondents were divided into two groups:

i. **EV users:** Those who have had actual experience with EVs. Their experience plays an important role in evaluating the advantages and disadvantages of EVs.

ii. **Potential consumers:** Those who have need and interest in using EVs in the near future (i.e., in the next one to two years). Understanding potential consumer needs informed future EV market trends and development.

Questionnaire

The questionnaire included key questions to collect information addressing the main study objectives. Before implementation, the research team operationalized the survey content based on the research objectives. This standardized the content into easy to understand and answer statements and questions. The questionnaire utilized primarily closed-ended questions to allow for statistical analysis and summarization of results. Some open-ended questions were included to capture variation in interviewee opinions.

Measurement scales were used depending on the objective of each survey topic. Nominal, interval, rating, and proportional scales were incorporated as each suited different assessment needs. This approach standardized the data collection instrument while ensuring validity and reliability. Specifically:

- **i.** The *nominal scale* was used to identify groups of survey respondents. Who are they? In which age range do they typically fall? Which group of consumers do they belong to?
- **ii.** The *interval scale* was used to determine the duration of using EVs or to estimate the household income of the interviewees, as examples.
- **iii.** The *hierarchical scale* and the *proportional scale* were used to assess the perceived advantages and disadvantages of EVs, the level of satisfaction of interviewees, etc.

Interview practice

After being instructed on the contents of the interview(s), each interviewer had an internal practice session with other interviewers on the questionnaire. Before conducting the actual interview, each interviewer practiced the questionnaire with a respondent once again.

Ensuring interview quality

BAHQVP followed Esomar's research sequence for quality control. 20% of interviews were quality checked via re-contacting respondents within 48 hours. For any interviewers found violating protocol, 100% re-interviews were conducted. Offending interviewers were suspended pending clarification of issues.

Quality control also validated sample selection methods, respondent eligibility criteria, and actual interview quality. Experienced interviewers trained in quality control standards and project requirements conducted controls while maintaining honesty.

The quality control team reported directly to project management, separate from interviewer and supervisor reporting lines. This oversight ensured accuracy and removed potential biases from influencing data collection.

Data processing and checking

BAHQVP's data processing follows Esomar regulations, with a closed process for question script design, data import, and chart generation. Drawing on experienced use of the SPSS statistical program, data processing accuracy is ensured at a high level. Prior to analysis, data imports are thoroughly scrutinized and checked for errors.

1.3.4 Sample selection plan

Geographical area

The survey was conducted nationwide, including in five major cities (Hà Nội, Hải Phòng, Đà Nẵng, Hồ Chí Minh City, Cần Thơ) and three provinces (Quảng Ninh, Thừa Thiên Huế, and Phú Yên).

Sample size

The appropriate sample size is usually determined by the following two formulas:

If the main objective of the study is the average: $$n \geq \frac{z^2\sigma^2}{\varepsilon^2} \quad (1)$$

If the main objective of the study is the proportion: $$n \geq \frac{z^2\, p(1-p)}{\varepsilon^2} \quad (2)$$

In which:

- ***z*** *is the confidence coefficient obtained from the standard normal distribution table. The commonly used level of confidence in research is 95 percent, which corresponds to z = 1.96.*
- ***σ*** *is the standard deviation of the population from previous studies, in case the main research objective is the average.*
- ***p*** *is the proportion of the overall from previous studies, in case the main research objective is the proportion.*
- ***ε*** *is the allowable error.*

(1) The main study objective is the satisfaction rate

If the main study objective is determining the satisfaction rate (i.e., achieving a rating of four or higher on a five-point scale), the sample size is calculated using formula (2). To calculate the sample size, we need to know the proportion ***p*** based on previous studies or experiences, and the allowable error ***ε*** accepted by the information user.

If the allowable error is small, the required sample size will be larger, and vice versa. The meaning of this error is that if UNDP accepts an allowable error of ± 0.02 (2 percent), and the research results show a satisfaction rate of 80 percent for the EV product, the actual satisfaction rate of the market is within the range of 80 percent ± 2 percent, which means between 78 percent and 82 percent.

If a confidence level of 95 percent is used and the estimated satisfaction rate (the most important proportion in the study) is around 80 percent, with an allowable error of one percent, the required sample size to be surveyed is:

$$n \geq \frac{z^2\, p(1-p)}{\varepsilon^2} = \frac{1{,}96^2\; 0{,}8(1-0{,}8)}{0{,}01^2} = 6147$$

If a confidence level of 95 percent is used and the estimated satisfaction rate (the most important rate in the study) is about 80 percent, with an allowable error of one percent, the sample size to be surveyed is very large, at 6,147. If the allowed error of two percent is accepted, the sample size to be surveyed is 1,537. The results still reflect the overall market, but are effective in terms of budget investment, human resources and implementation time. The table below shows the sample sizes corresponding to the estimated proportion to be studied and the allowable error calculated according to the above formula.

Option	Confidence level	Estimated proportion (p)	Allowable error (ε)	Sample size
1	95%	60%	1.0%	9220
2	95%	70%	1.0%	8067
3	95%	80%	1.0%	6147
4	95%	60%	2.0%	2305
5	95%	70%	2.0%	2017
6	95%	80%	2.0%	1537

If the main study objective is the satisfaction average (of all ratings on a five-point scale), the sample size is calculated using formula (1). To calculate the sample size, we need to know the standard deviation **σ** based on previous studies or experiences, and the allowable error **ε** accepted by the information user. If the allowable error is small, the required sample size will be larger, and vice versa. The meaning of this error is that if UNDP accepts an allowable error of ± 0.1 and a confidence level of 95 percent, and the research results show a rating of 3.8 for the EV product, the actual average rating for the entire market is within the range of 3.8 ± 0.1, which means between 3.7 and 3.9 with a confidence level of 95 percent.

To determine sample size using this formula, we need to estimate the standard deviation and allowable error. However, we do not have any information about the standard deviation from previous or similar studies. Therefore, we can use the following approximation formula to estimate the standard deviation:

$$\sigma = \frac{x_{\max} - x_{\min}}{6}$$

In terms of the allowable error, when using a five-level rating scale, a requirement for an error of 0.1 is considered extremely small. By applying the aforementioned formula, we can estimate the sample size based on the error and by assuming three different scenarios of standard deviation, as follows:

Scenarios of evaluation	Estimation σ	Sample size with 95% confidence level	Occurrence
Very different	1,50	865	Often
Moderately different	1,00	384	Medium

Somewhat different	0,67	173	Rare

With a five-level rating scale, an allowable error of 0.2 is relatively small. Using the formula, we can calculate the sample size based on the error and by assuming three different scenarios of standard deviation, as follows:

Scenarios of evaluation	Estimation σ	Sample size with 95% confidence level	Occurrence
Very different	1,50	216	Often
Moderately different	1,00	96	Medium
Somewhat different	0,67	43	Rare

Larger surveys are limited by cost and time requirements. However, EV use levels remain low across many localities, so reliability and representation would not differ greatly. The proposed 0.2 error on a five-point satisfaction scale still captures overall market results effectively while optimizing resources.

This study aims to measure user satisfaction levels to propose EV promotion solutions, making satisfaction averages the primary objective. From the above calculation basis, 106 samples are proposed per research unit (province/city), especially Ho Chi Minh City and Ha Noi with large populations and high EV concentration. Two areas with disparate living standards but high national EV usage was also selected to account for variability in demand, expectations, and consumer opinions on EVs between locales. Therefore, the sample size per locality was increased to 216 - a reliable option balancing representative results against reasonable costs and feasibility. It means that sample size ensures findings accurately portray the overall population while maintaining high reliability.

Number of samples in the study areas

The direct survey covered five major cities and three provinces – Thừa Thiên Huế, Phú Yên, and Quảng Ninh. These locations were selected as they represent important regional economic centers with dense populations and relatively high living standards. Additionally, they have higher than average EV usage compared to other localities within their regions and nationwide. In addition, the survey also focused on areas where UNDP is piloting communications, support, and promotional initiatives to encourage EV adoption.

To supplement the in-person research, an online questionnaire collected approximately 215 additional responses nationwide, representing 20% of the direct survey sample size. The digital survey utilized a pre-prepared Google Forms questionnaire disseminated via email, social media, fan pages, and Zalo.

Survey approach	Hà Nội	Hải Phòng	Đà Nẵng	HCM City	Cần Thơ	Huế	Phú Yên	Quảng Ninh	Total
Direct survey sample	216	106	106	216	106	106	106	106	**1,068**
Online survey sample									**215**

Allocation of samples at study areas

Level 1

The proportion of the survey sample in each province/city will be allocated to (1) the group of EV users and (2) the group of potential EV consumers. The number of survey samples for each target group is determined based on the proportion of the total number of road vehicles in circulation and the average new vehicles purchased annually in the next five years.

Statistics by MOIT, there are currently about three million electric bicycles and electric motorbikes in circulation. The number of electric bicycles and electric motorbikes that are purchased annually is about 300,000, on average. According to Viet Nam Register, there are currently only 1,500 electric cars registered for circulation nationwide. Around 500 electric cars are purchased annually on average. Based on these figures, the survey sample was calculated as 67% for existing EV consumers and 33% for potential future EV consumers. This proportion reflects the current EV landscape while also accounting for expected growth patterns.

Level 2

From the sample proportions of the above two groups of respondents, the number of survey samples continues to be allocated in detail to the following groups: (1) consumers who have used electric bicycles and electric motorbikes; (2)

consumers who have used electric cars; (3) potential consumers of electric bicycles and electric motorbikes; and (4) potential consumers of electric cars.

However, statistics show the proportion of electric car users versus electric bicycles/motorbikes is much lower, as is the proportion of ICE car users versus ICE motorbike users. The number of surveyed electric car consumers and potential consumers would be too small to reliably represent these groups. Therefore, the survey team proposed allocating samples nominally to target groups for each vehicle type. This was to overcome limitations posed by disproportionately low electric car usage currently. By adjusting the allocation method, more robust insights could be captured across all relevant vehicle segments.

<table>
<tr><th colspan="2" rowspan="2">Survey object</th><th colspan="2" rowspan="2">Rate</th><th colspan="3">North</th><th colspan="3">Central</th><th colspan="2">South</th><th rowspan="2">Total</th></tr>
<tr><th>Hà Nội</th><th>Hải Phòng</th><th>Quảng Ninh</th><th>T.T. Huế</th><th>Đà Nẵng</th><th>Phú Yên</th><th>HCM City</th><th>Cần Thơ</th></tr>
<tr><td rowspan="2">Consumers</td><td>Electric bicycles and motorbikes</td><td rowspan="2">67%</td><td>65%</td><td>136</td><td>71</td><td>71</td><td>71</td><td>66</td><td>71</td><td>136</td><td>71</td><td>694</td></tr>
<tr><td>Electric cars</td><td>2%</td><td>8</td><td>0</td><td>0</td><td>0</td><td>5</td><td>0</td><td>8</td><td>0</td><td>21</td></tr>
<tr><td rowspan="2">Potential consumers</td><td>Motorbikes</td><td rowspan="2">33%</td><td>28%</td><td>60</td><td>30</td><td>30</td><td>30</td><td>30</td><td>30</td><td>60</td><td>30</td><td>299</td></tr>
<tr><td>Cars</td><td>5%</td><td>12</td><td>5</td><td>5</td><td>5</td><td>5</td><td>5</td><td>12</td><td>5</td><td>54</td></tr>
<tr><td colspan="4">Direct Survey Sample</td><td>216</td><td>106</td><td>106</td><td>106</td><td>106</td><td>106</td><td>216</td><td>106</td><td>1,068</td></tr>
<tr><td colspan="4">Online survey sample</td><td colspan="9">215</td></tr>
</table>

Survey period

From 15 June 2022 to 2 November 2022.

PART TWO:

RESULTS OF CONSUMER SURVEY ON ELECTRIC VEHICLES

2.1 GENERAL SURVEY RESULTS

The survey collected responses through both nationwide online surveys and offline surveys conducted in five major cities (Hà Nội, Hải Phòng, Đà Nẵng, Hồ Chí Minh City, and Cần Thơ) and three provinces (Quảng Ninh, Thừa Thiên Huế, and Phú Yên) currently piloting EV promotion activities.

A total of 1,427 responses were received through these two formats. Of these, 1,283 responses were deemed valid while 144 were invalid. Among the 1,283 valid questionnaires, 785 respondents (55%) had used EVs while 498 (35%) had not used EVs but expressed interest in future usage.

The 144 invalid responses represented approximately 10% of the total. These came from consumers who fell outside the target respondent groups. Information was only collected from them on "reasons for not needing EV use". This ensures a more focused collection of meaningful data from relevant existing and potential EV consumers.

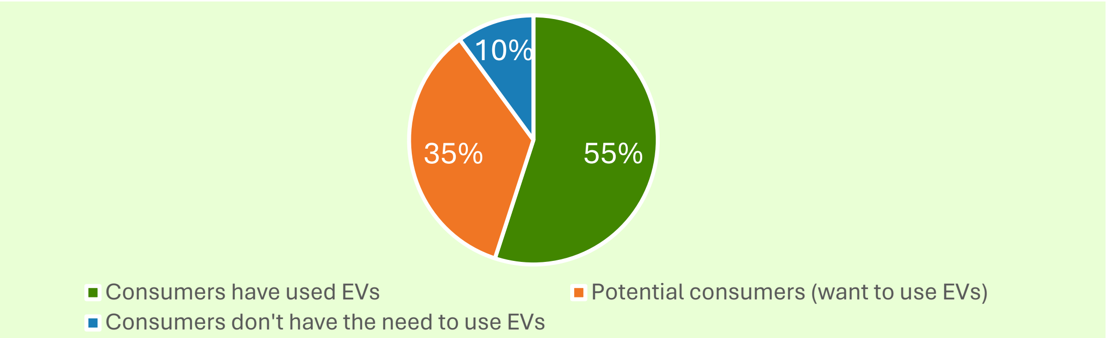


Figure 1: Survey sample composition

There were 215 online respondents and 1,068 offline respondents, equivalent to 83 and 17 percent, respectively.

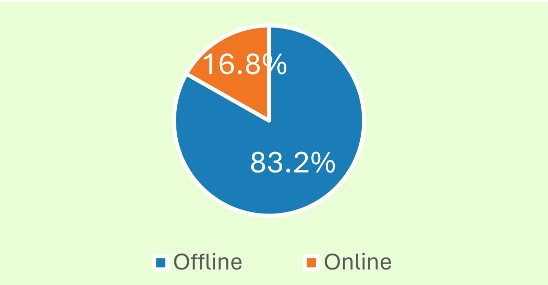


Figure 2: Survey sample by modality (offline vs. online)

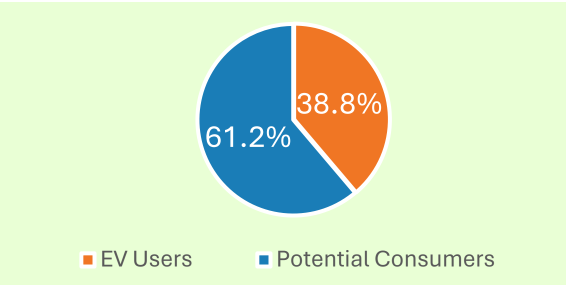


Figure 3: Survey sample by group (consumers vs. potential consumers)

Given the project's objective to examine consumer demand for and evaluation of EVs, the survey sample focused more heavily on respondents who have the means to access or have used various EV types. Specifically, priority was placed on collecting viewpoints from consumers who are: Women aged 16-42 years old (Gen Z and Gen Y[1]), and University/College students or graduates. Targeting these demographics enhanced insights around EV adoption drivers and perceived attributes from populations more likely to be early adopters or future buyers. By concentrating sampling toward individuals with higher EV exposure and purchasing power, the survey data reflected pertinent perspectives on shaping wider market potential and uptake.

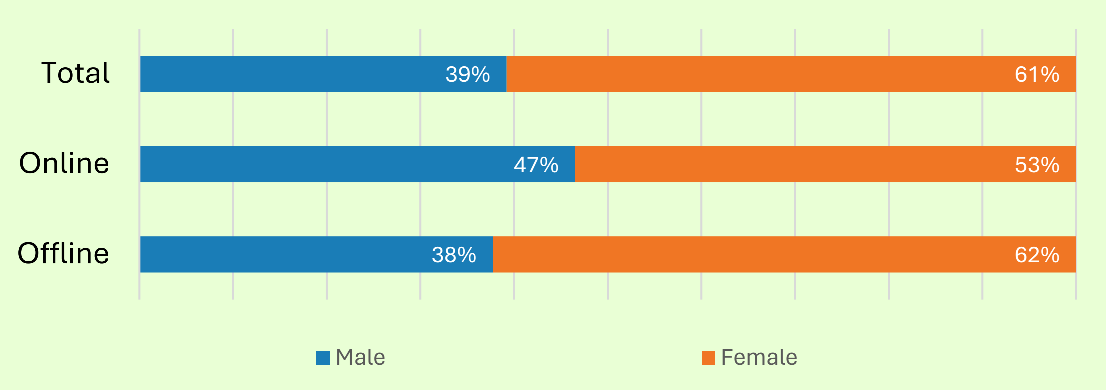


Figure 4: Survey sample by gender

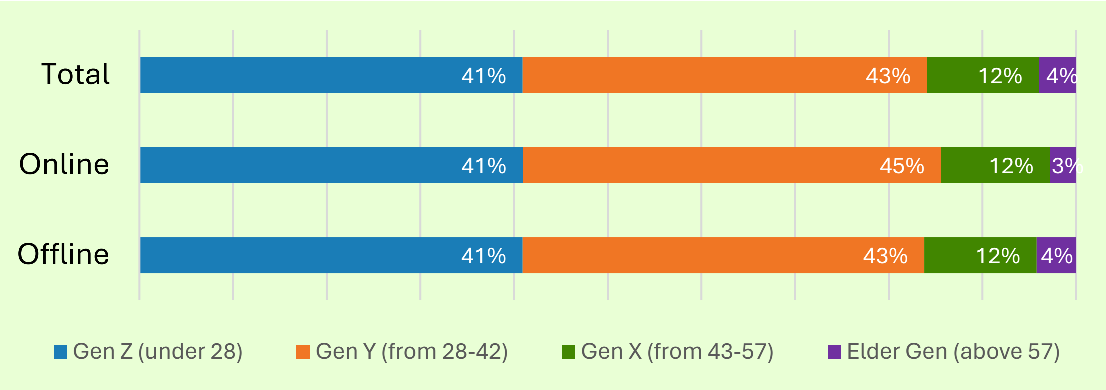


Figure 5: Survey sample by generation

[1] *According to the research of Professor Philip Kotler and colleagues, there are currently five generations that marketers need to study and understand: Gen X, Gen Y, Gen Z, Gen Alpha and Baby Boomers.*

- *Gen Y - people born between 1981 and 1996. Highly tech savvy, now at the age of entering the workforce. They are currently the fastest growing labour segment. This generation is characterized by wanting everything at once, impatient and volatile.*
- *Gen Z - people born between 1997 and 2009. Those who are preparing to enter the mainstream workforce. This generation is driven by social rewards, mentorship, and constant feedback. Gen Z has good access to smart devices, social networks, high technology, fast living virtual life, and is under a lot of competitive pressure on material and reputation.*

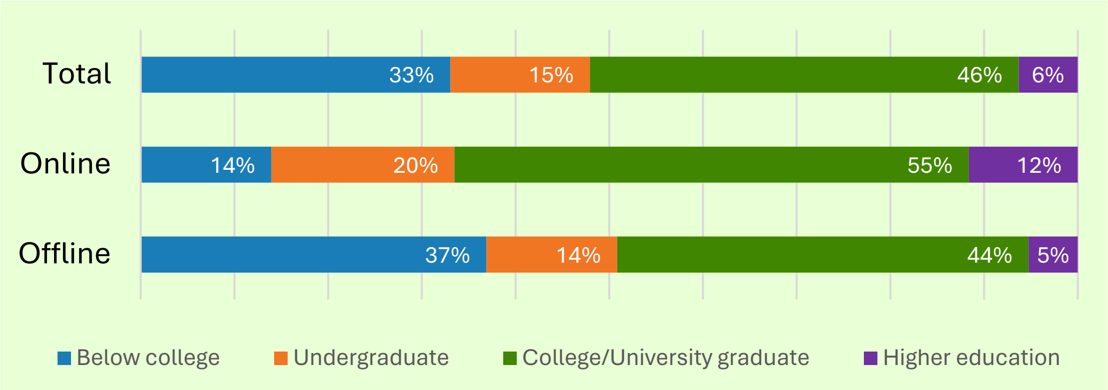


Figure 6: Survey sample by education level

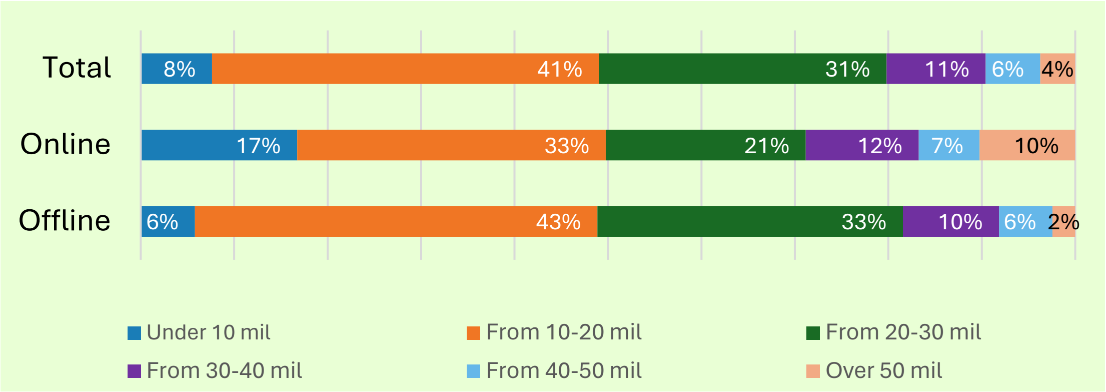


Figure 7: Survey sample by monthly household income (VND)

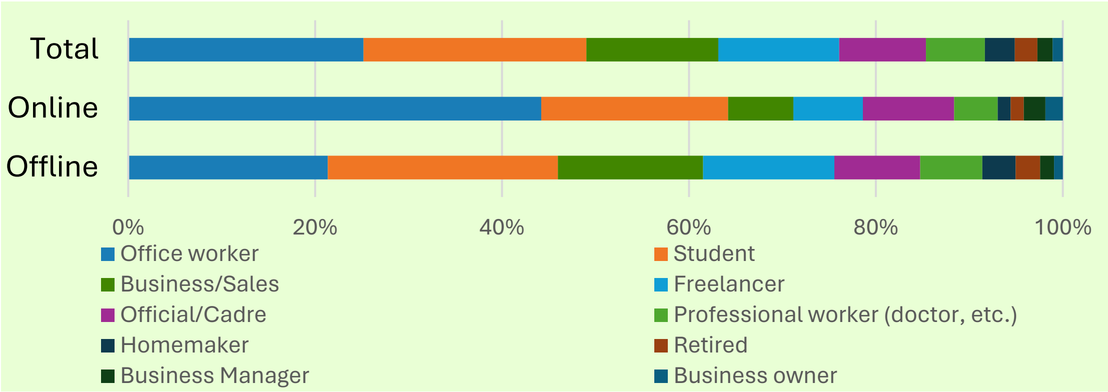


Figure 8: Survey sample by occupation

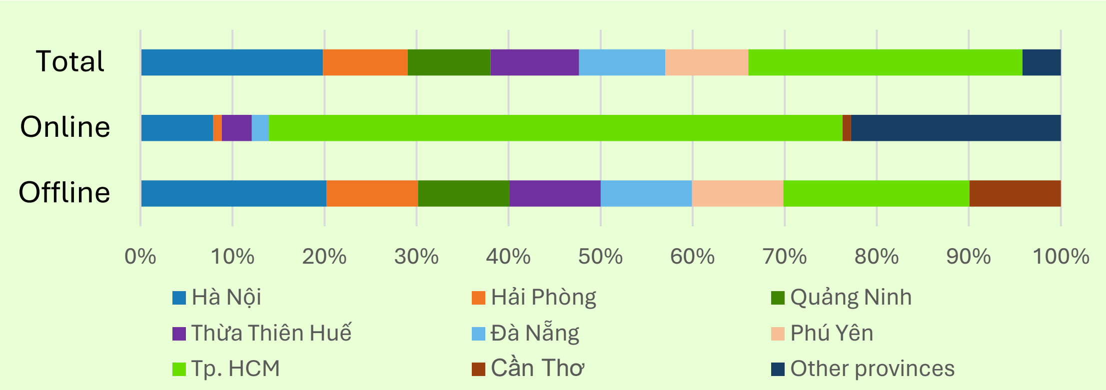


Figure 9: Survey sample by location

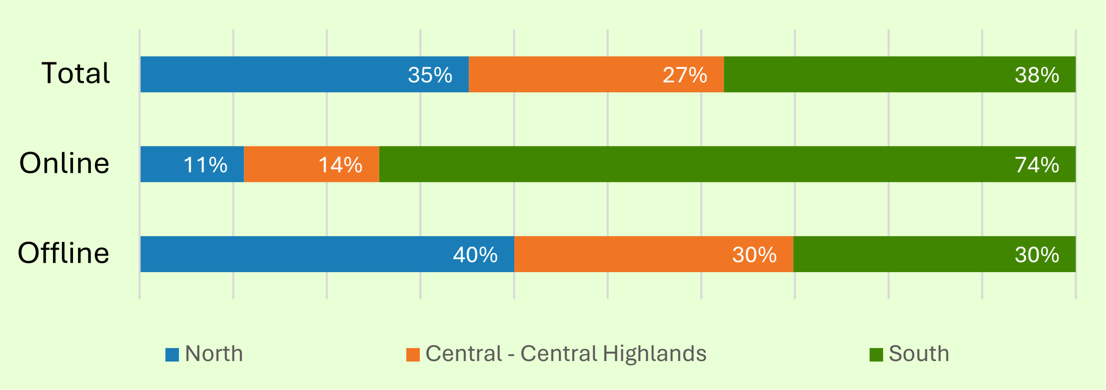


Figure 10: Survey sample by region

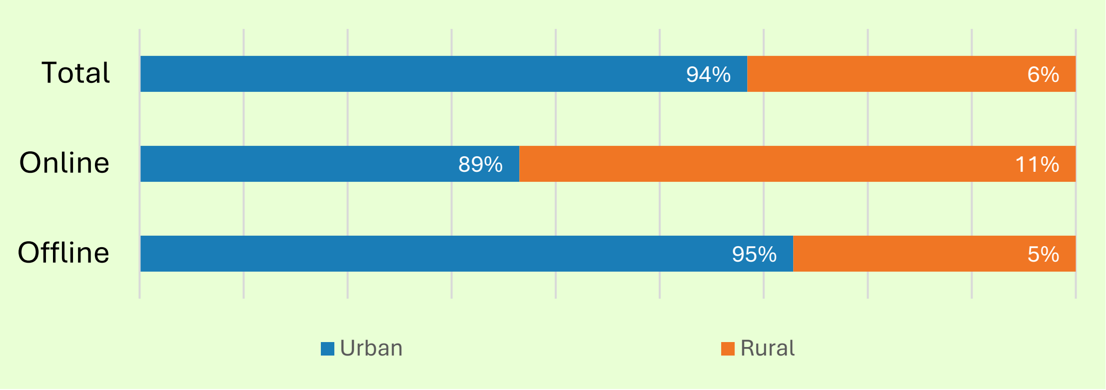


Figure 11: Survey sample by living area

2.2 ELECTRIC VEHICLE DEMAND AND TRENDS

2.2.1 Electric vehicle usage and ownership

2.2.1.1 Vehicle ownership

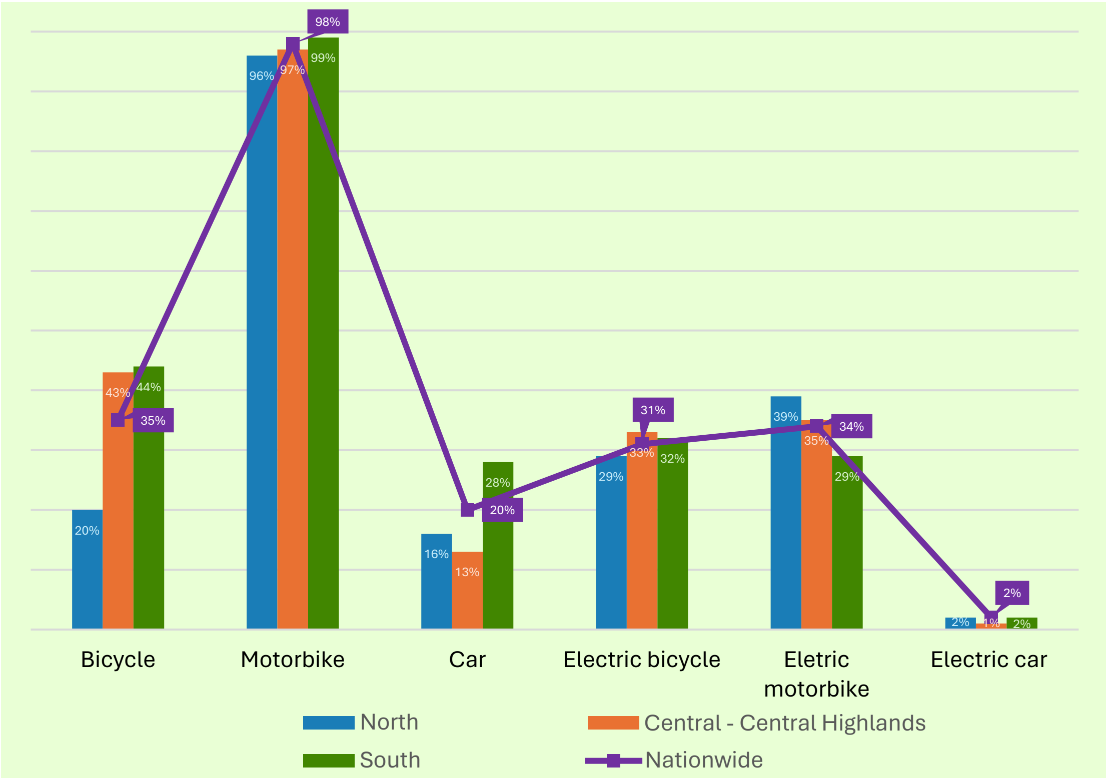


Figure 12: Rate of households using vehicles by region

The results in Figure 12 indicate that approximately one third of households in Vietnam currently own multiple vehicle types, with internal combustion engine (ICE) vehicles predominating. Motorcycles represent the most common vehicle owned by most households, with 98% reporting motorcycle ownership.

The survey found that among respondents, approximately 34% of households own electric motorbikes, 31% own bicycles, while just 2% own electric cars. This number is still modest, but it is a positive indication of the increase in ownership of EVs in Viet Nam in recent years.

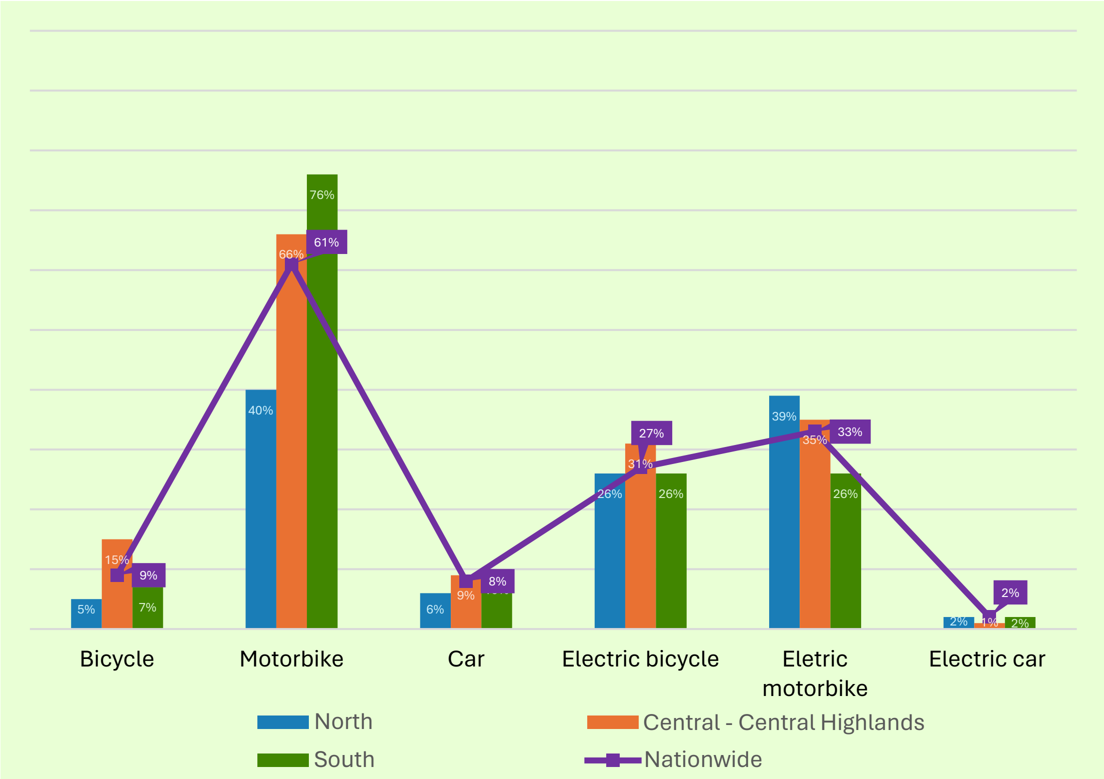


Figure 13: Rate of using vehicles

The survey findings on vehicle usage (Figure 13) show that motorbikes comprise the vast majority, with 61% of respondents using them. Motorbike usage is highest in the southern region at 76%. EV ownership proportions match usage proportions, indicating EV owners, especially of electric motorbikes, are more likely to actively utilize their vehicle(s) compared to non-EV owners.

Compared to four-wheeled EVs, two-wheeled EVs like electric motorbikes and bicycles have seen greater acceptance and usage in Vietnam. The survey findings mirror VAMM statistics showing nearly 500,000 electric motorbikes/bicycles sold in 2017, a 30% increase over 2016. Growth remained strong at 40% in 2018.

Domestically, VinFast launched their first electric motorbike model - the Klara - in late 2018 with lithium-ion and lead battery options. In 2019, VinFast expanded their Klara A2 line and introduced battery swapping through VinMart+ stores across major Vietnamese cities. By end of 2019, VinFast's two-wheeled EV sales had reached 50,000 units.

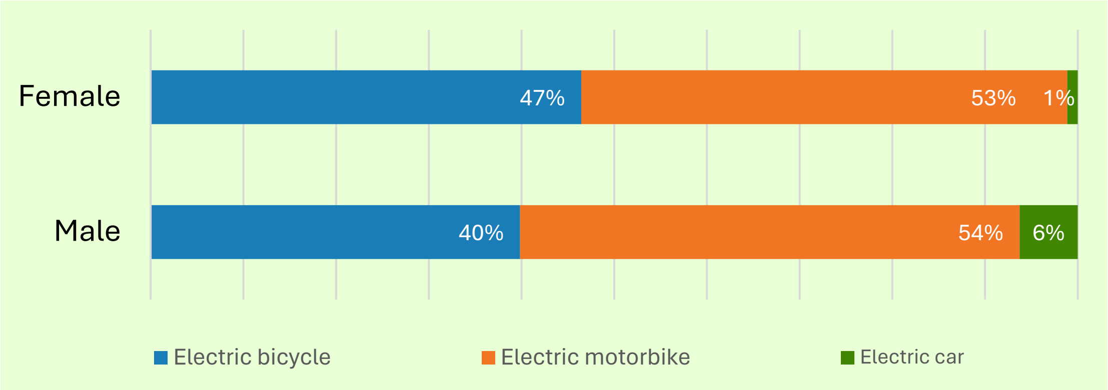


Figure 14: EV usage by gender

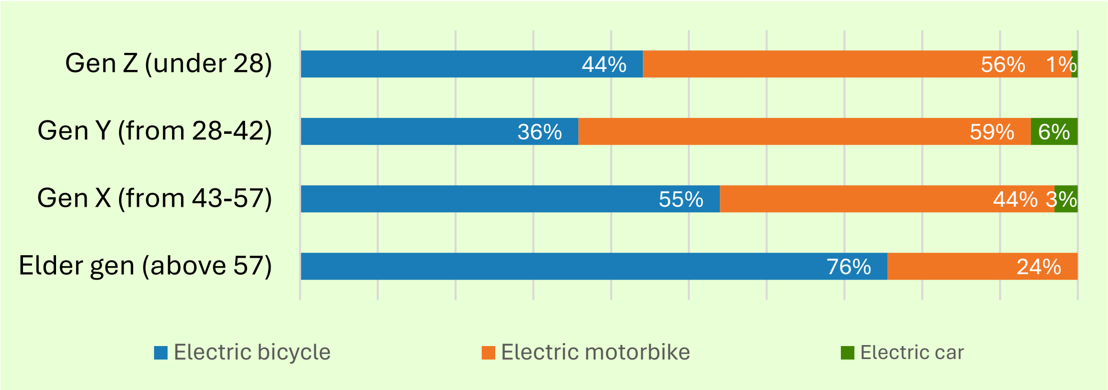


Figure 15: EV usage by generation

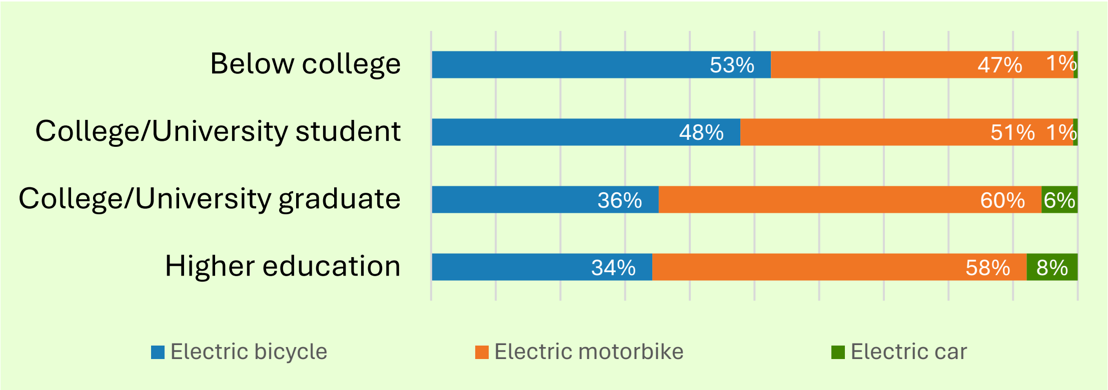


Figure 16: EV usage by education level

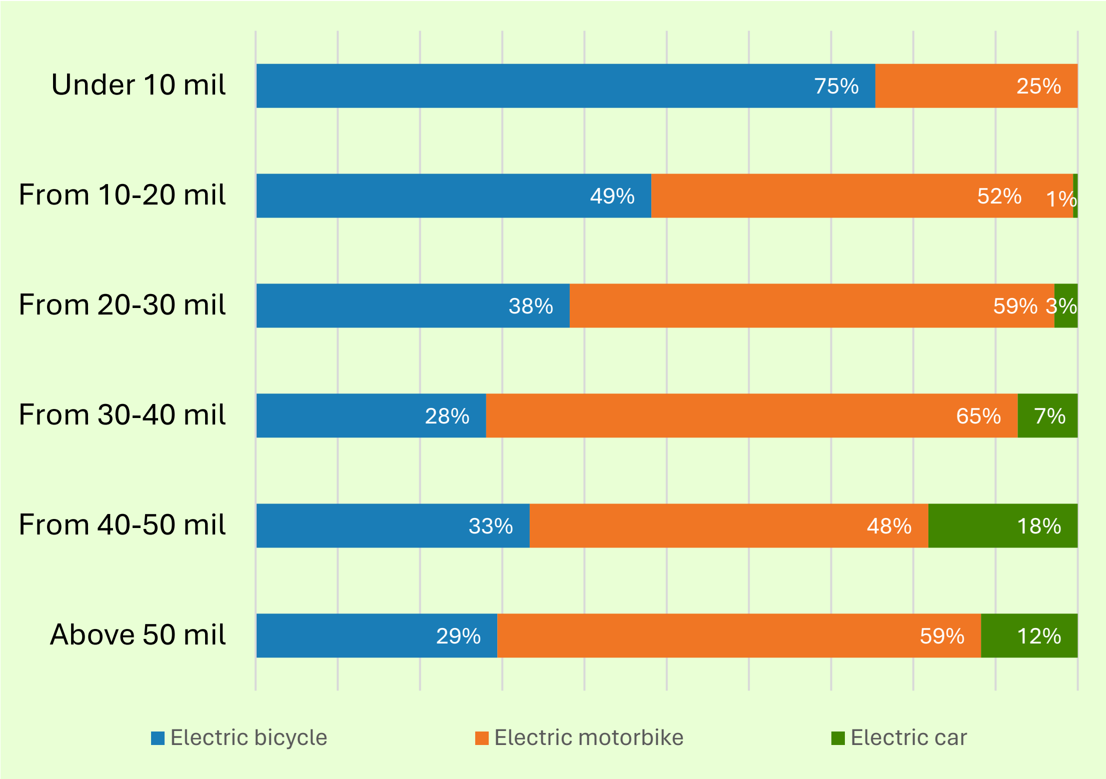


Figure 17: EV usage by monthly household income (VND)

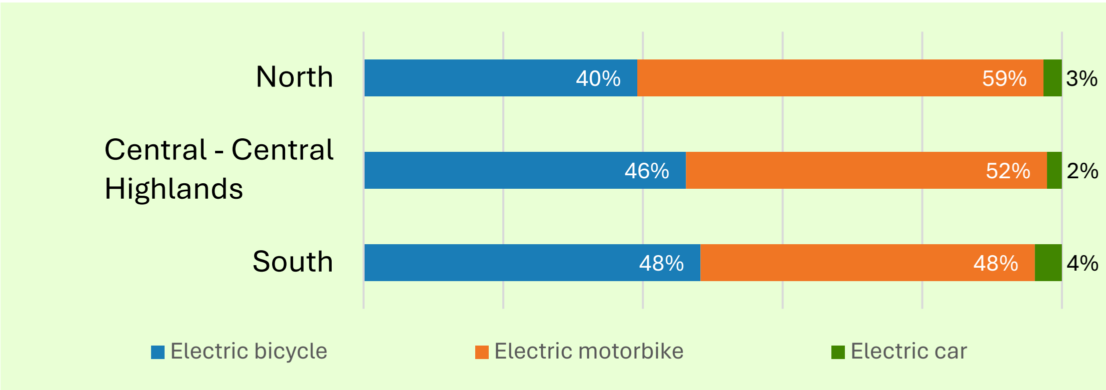


Figure 18: EV usage by region

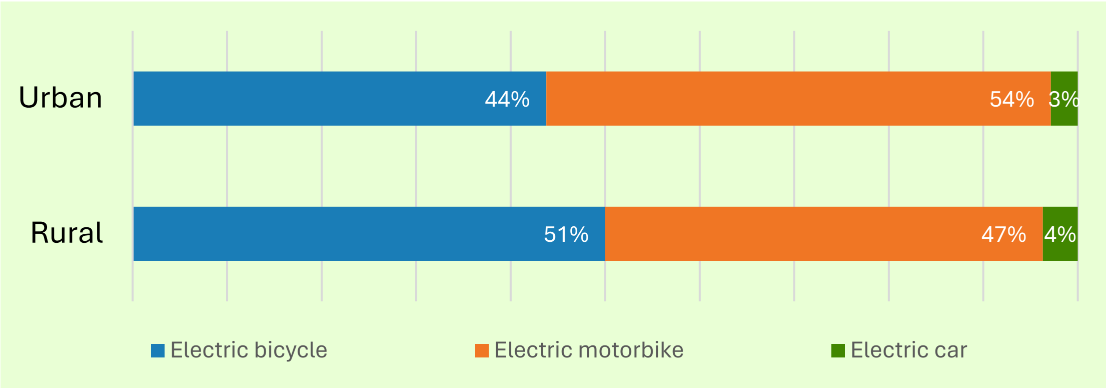


Figure 19: EV usage by living area

Analysis showed older consumers tended to use electric bicycles more, with 76% of elder generation and 55% of Gen X EV users preferring them. Comparatively, electric bicycle usage was lower among younger Gen Y (36%) and Gen Z (44%). Instead, younger Gen Z (59%) and Gen Y (56%) EV users favored electric motorbikes more than Gen X (44%) and elder generation (24%) users. The survey also found middle-aged Gen Y and X consumers (28-57 years old) comprised the primary electric car user group.

Additionally, high-income and highly educated consumers demonstrated higher electric motorcycle and car usage. Specifically, 66% of university-educated consumers and 52% of university/college students used electric motorbikes/cars. Likewise, over 70% of consumers with monthly household incomes above 30 million VND used electric motorbikes/cars. Usage declined with income, with only 25% of under-10 million VND households adopting electric motorbikes, and no electric car usage reported.

These findings indicate consumer age, education level, and income influence EV type decisions and accessibility. Younger, affluent and educated users pioneered electric motorbike and car adoption to date.

2.2.1.2 Duration of electric vehicle usage

To gain insights into the maturity of Vietnam's EV market and adoption trends over time, the survey inquired about respondents' duration of EV usage. Understanding how long consumers have been utilizing different EV types provides useful context on patterns and stages of market development. The results help sketch an overall picture of current EV usage habits and their progression.

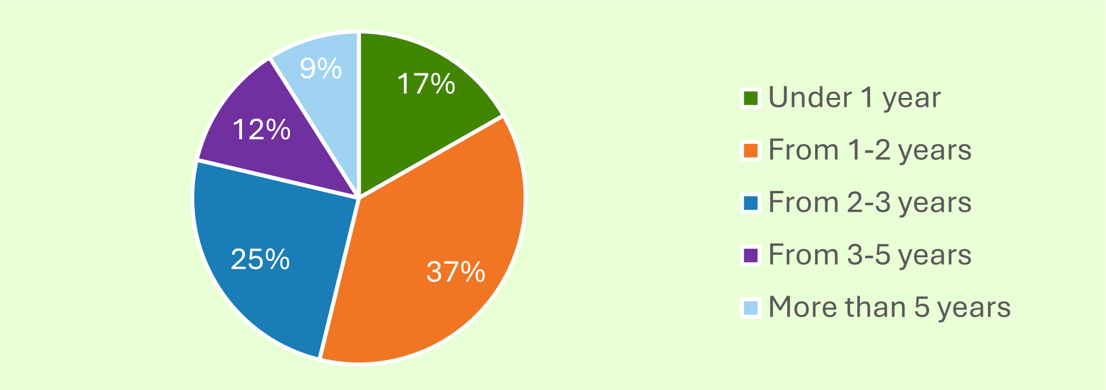


Figure 20: Duration of EV usage

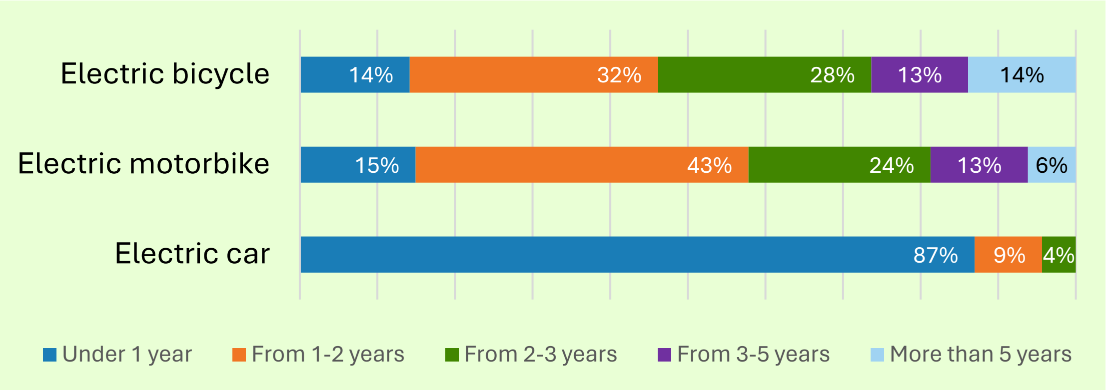


Figure 21: Duration of EV usage (by vehicle type)

The majority of Vietnamese consumers (79%) reported using various EVs in the past three years only. Electric cars saw the most recent uptake, with 87% of users adopting them approximately one year ago. Comparatively, 4% had used electric cars for 2-3 years. Electric motorbikes and bicycles saw earlier adoption, though very low rates used them over five years ago (6% and 14% respectively). Low EV usage until recently can be attributed to prior limitations in transport accessibility, consumer unfamiliarity, and limited supply varieties. On the other hand, this result also suggests that the implementation of programmes to promote the increase in production and use of high-speed electricity has become gradually more effective.

There was little variation in usage duration between consumer groups, except urban residents generally reported starting EV use slightly earlier than rural residents. Specifically, 17% of rural versus 21.7% of urban consumers had used EVs for over three years.

2.2.1.3 Purpose of electric vehicle usage

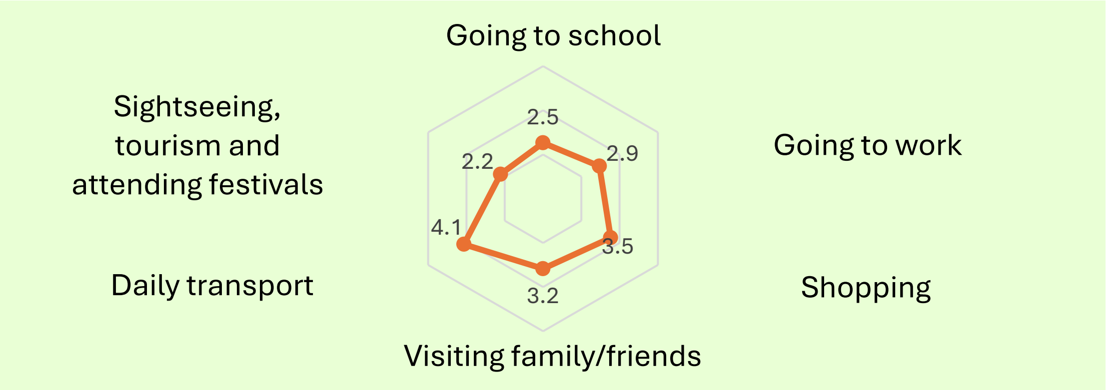


Figure 22: Purpose of EV usage

To understand the primary reasons for EV usage and associated usage frequency levels, respondents were asked to rate different purposes on a 5-point scale. At one end was 'never' and at the other end was 'very often'. A higher score, closer to five, implied more regular use of EVs for that particular purpose.

The survey findings revealed that daily transportation ranks as the primary purpose consumers use EVs. This is followed by shopping, visiting relatives/friends, commuting to work, and attending school. The least common application is travel, sightseeing or festivals. It appears EVs have predominantly been adopted to fulfil daily mobility needs at this stage. However, their utilization for special occasions such as tourism activities, travel and festivals remains relatively limited.

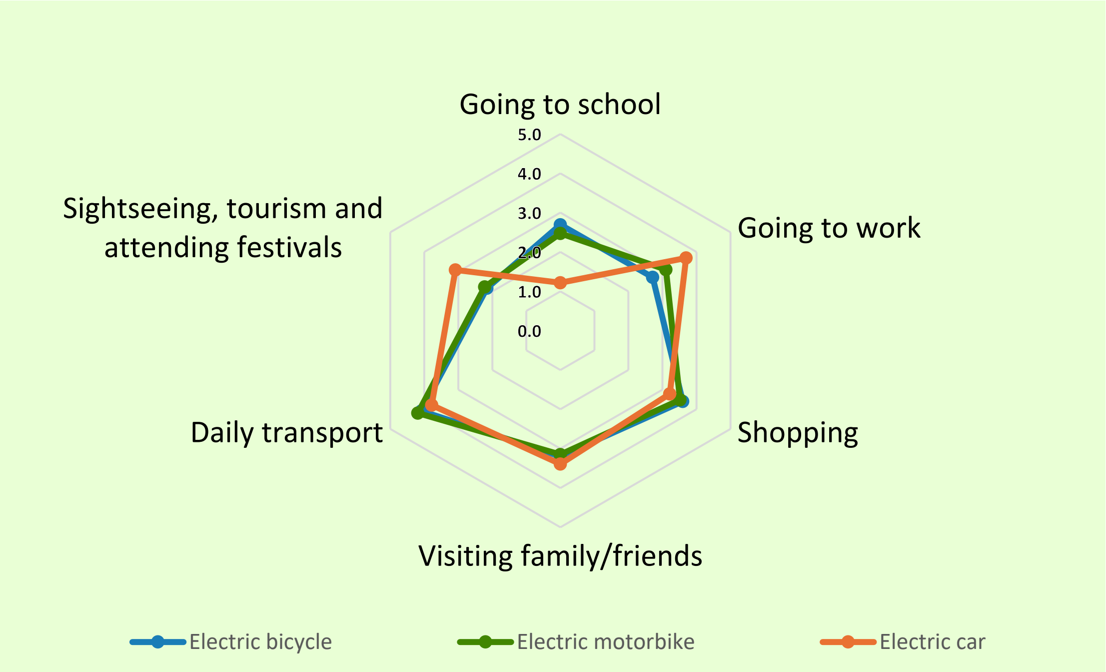


Figure 23: Purpose of EV usage (by vehicle type)

While the survey found little variation in frequency of EV use for daily transportation, shopping and visiting others, there were notable differences for commuting to work/school and sightseeing/tourism/festivals. Specifically, electric cars see more regular utilization than electric motorbikes or bicycles for purposes of travel, work and sightseeing. However, electric motorbikes and bicycles are employed more frequently for school commuting needs compared to electric cars.

2.2.2 Market demand and trends of using electric vehicles

2.2.2.1 Market demand of electric vehicles

Vietnam's EV market is poised for further growth as the government undertakes ambitious climate actions. Recently, Decision 876/QD-TTg outlined an Action Programme for Green Energy Transition and Carbon Dioxide/Methane Emission Reduction in Transport. The overarching objective is developing sustainable transportation infrastructure to support Vietnam's net-zero emissions commitment by 2050. A core strategy involves curtailing and eventually ceasing production/import of fossil fuel vehicles like gasoline cars and motorbikes.

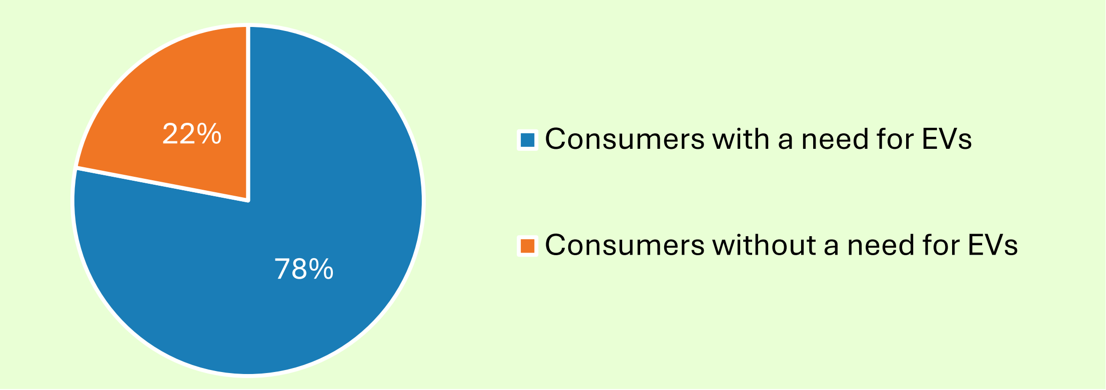


Figure 24: Respondents' demand/need for EVs

Of the 1,427 survey participants, only around 10% indicated no future EV needs (Figure 24). Reassuringly, 78% of non-users expect future EV utilization, signaling market potential.

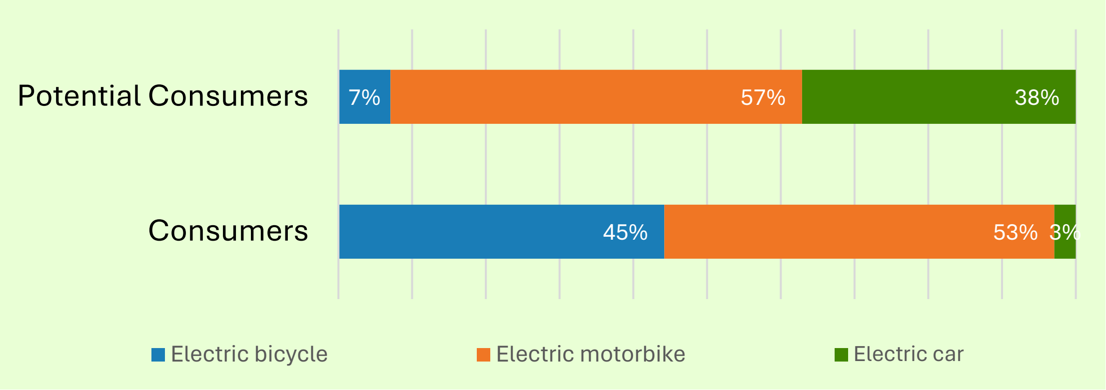


Figure 25: Demand/need of consumers and potential consumers for EVs (by vehicle type)

The results (Figure 25) also highlight significant expected growth in electric motorbike (57% potential consumers) and car demand (38%). Comparatively, electric bicycle interest remains stable (7%).

Given just 3% current usage but 38% projected need, electric cars appear primed for exponential increases. This aligns with electric cars still being a nascent category. Gen Y, Gen Z consumers with high incomes/education reported stronger electric motorcycle and car demands than older cohorts considering electric bicycles primarily.

In summary, preferences show Vietnam's EV landscape is dynamic, with motorcycles/bikes prevalent currently but indicators that cars may rise rapidly in response to growing interest if barriers continue falling.

2.2.2.2 Trends of electric vehicle usage

Most current EV users expect to maintain their electric bicycle/motorbike usage frequency. However, about 25% anticipate increasing usage of these vehicles. Notably, over 60% foresee rising electric car utilization due to perceived safety, environmental and cost benefits.

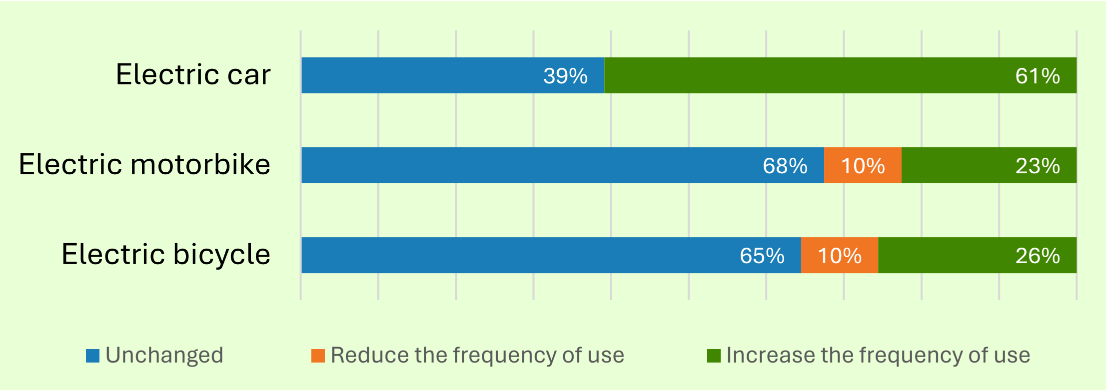


Figure 26: Expected frequency of using EVs in the near future

Potential consumers also signal future increases. The majority plan purchasing electric bicycles (81%) or motorbikes (62%) in the next few years indicating growing demand.

Electric cars represent a larger investment, yet 32% aim to buy within 5 years (30% within the next 5). While potentially a longer adoption cycle, interest also appears strong for these vehicles.

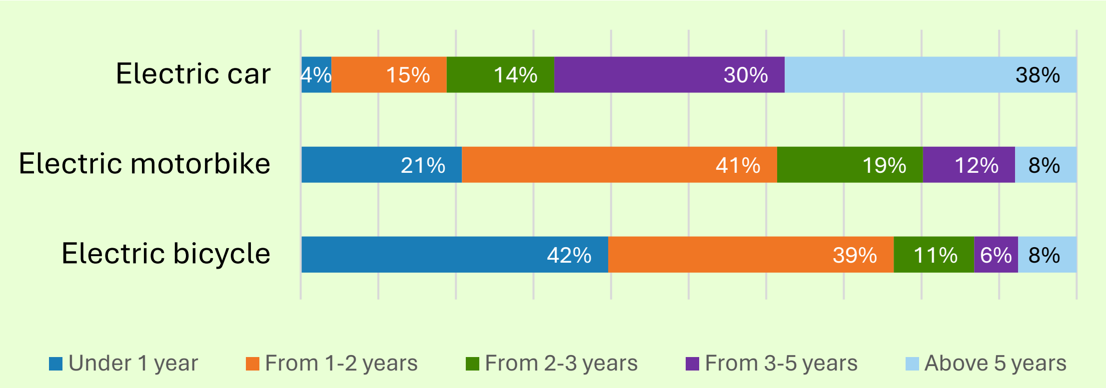


Figure 27: Expected time to purchase EVs

The survey findings regarding expected timeframes for peak EV utilization in Vietnam also provide encouraging signs.

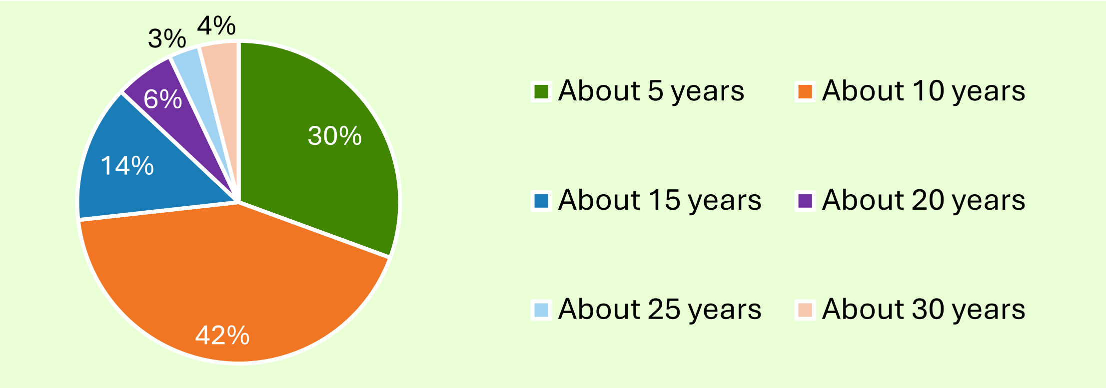


Figure 28: Period when EVs are expected to be commonly used

As shown in Figure 28, over 73% of respondents anticipate EVs becoming the most prevalent transportation mode within the next 10 years. Nearly a third further estimated this will occur within the next 5 years alone.

In summary, both current and prospective consumers foresee maintaining and expanding EV integration over time, especially as awareness of benefits grows regarding environmental, financial and safety advantages relative to gasoline alternatives. This bodes well for continuing market evolution.

2.2.3 Electric vehicle demographics

Currently, electric bicycles and motorbikes are primarily used by women under 42. Meanwhile, electric car users are predominantly males aged 28-42. Looking ahead, potential electric bicycle and motorbike consumers remain women aged

28-42 of Gen Y. Similarly, electric car demand remains centered on men in the same age group.

While future usage patterns broadly align with present trends, some changes are anticipated. For example:

- Men are projected to increasingly adopt electric bicycles and motorbikes compared to currently.
- Women's electric car usage is also expected to rise relative to the present.
- Those aged 28-42 of Gen Y may utilize bicycles and motorbikes more than they do now.

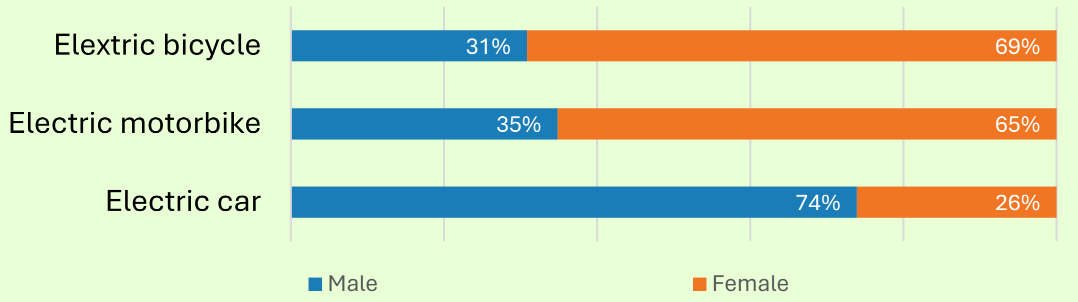


Figure 29: Consumers by gender

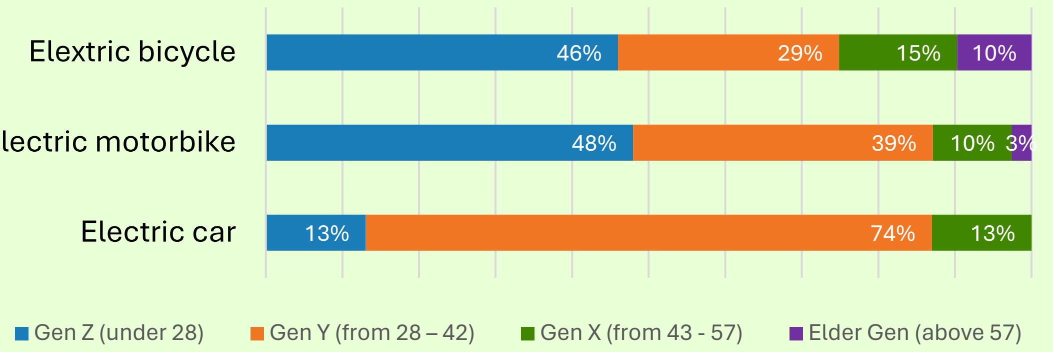


Figure 30: Consumers by generation

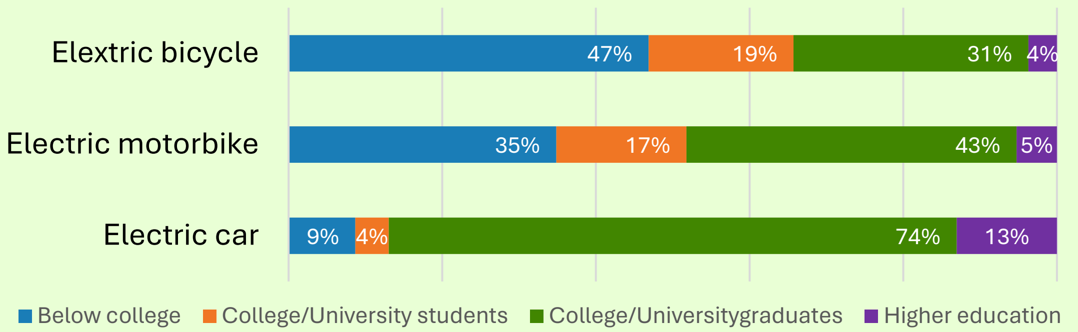


Figure 31: Consumers by education level

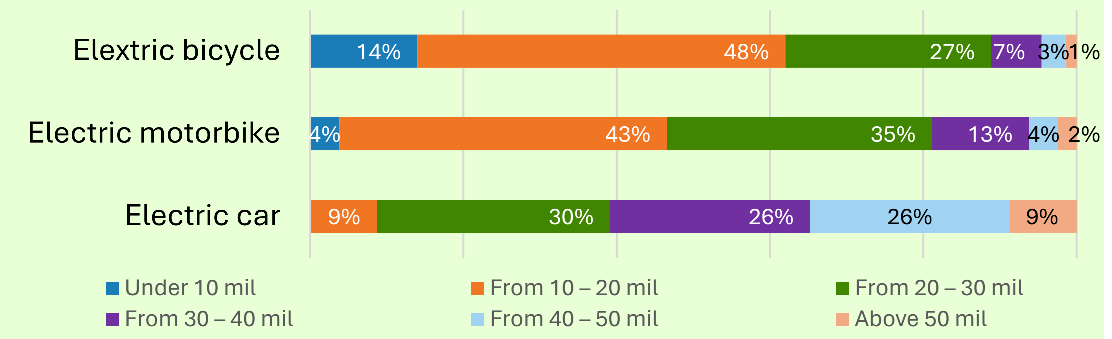


Figure 32: Consumers by household income (VND)

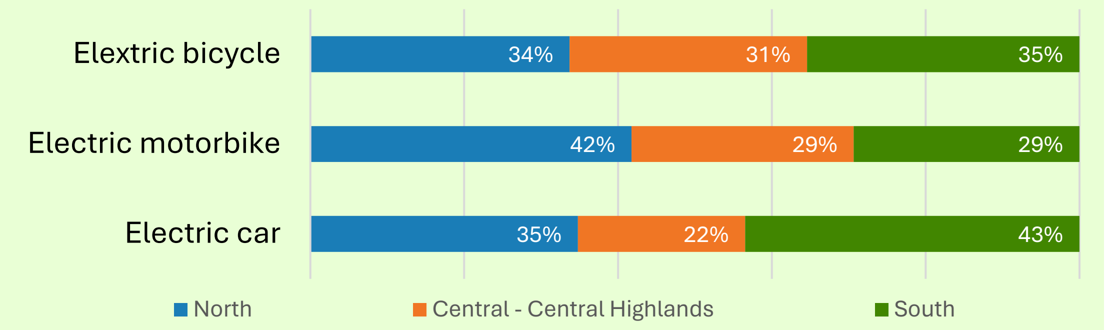


Figure 33: Consumers by region

Consumers

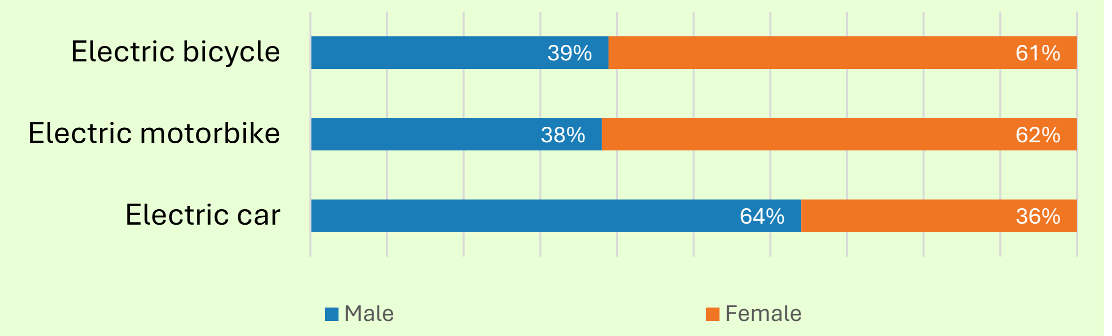


Figure 34: Potential consumers by gender

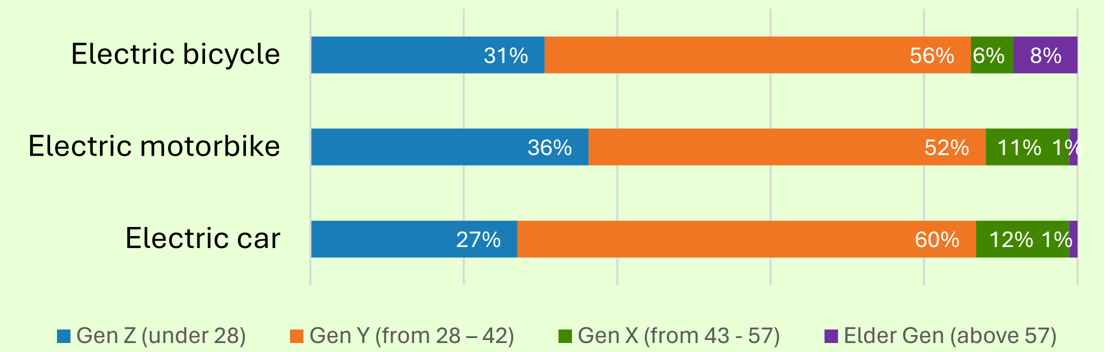


Figure 35: Potential consumers by generation

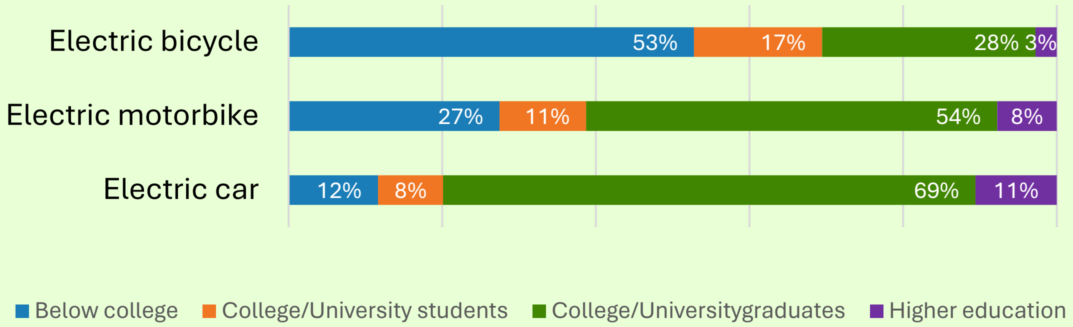


Figure 36: Consumers by education level

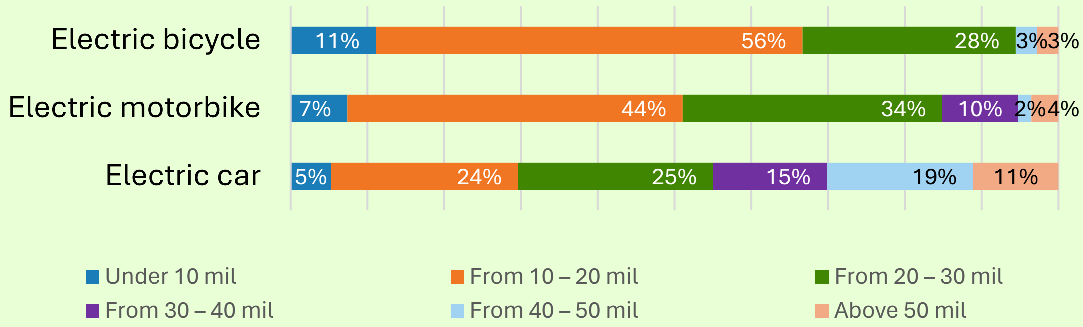


Figure 37: Potential consumers by household income (VND)

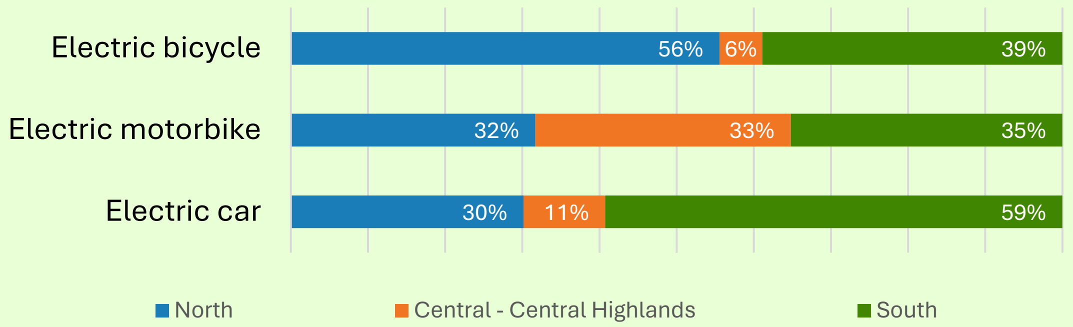


Figure 38: Potential consumers by region

Potential consumers

2.3 CONSUMER EVALUATION OF ELECTRIC VEHICLES

2.3.1 Consumer evaluation of electric vehicles

In this study, to assess consumer opinions and evaluations on EVs, a normative scale from one to five was used to measure consumers' level of agreement with statements about EVs.

2.3.1.1 Consumer evaluation of quality, design and features of electric vehicles

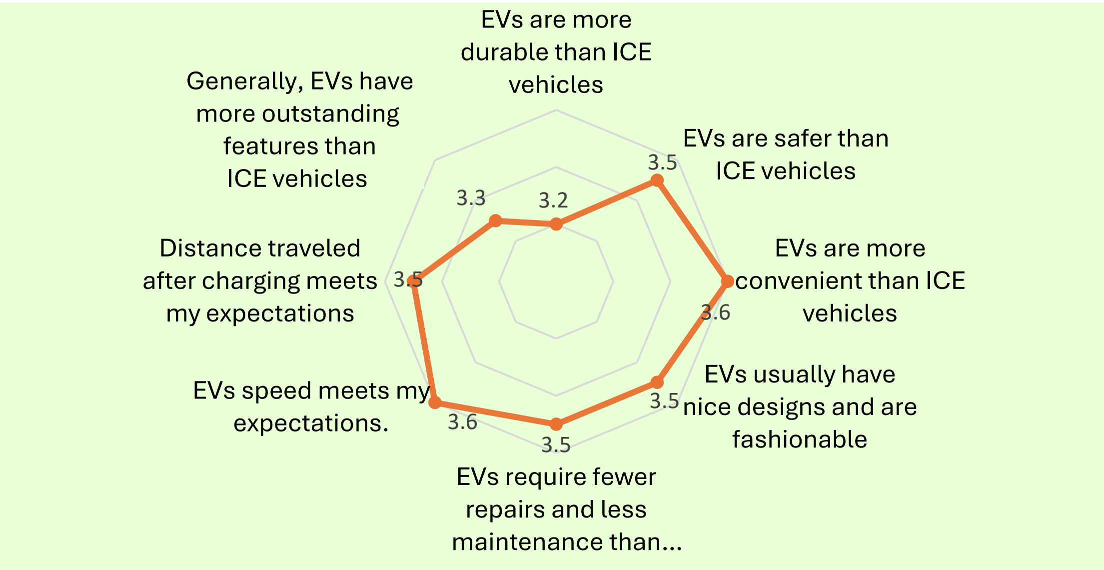


Figure 39: Consumer evaluation of the quality, design and features of EVs

Consumer evaluations suggest room for improvement in EV quality, design and features compared to gasoline vehicles, averaging 3.2-3.6 points on a 5-point scale. Manufacturers should continuously pursue strategies to enhance all EV aspects and bolster marketability through improved satisfaction. Specifically, durability and standout features received the lowest ratings of 3.2 and 3.3 points respectively, signifying priority areas for manufacturers to address.

In addition to quality upgrades, businesses must implement promotional programs, activities and experiential events. These initiatives can provide consumers access to information and hands-on product exposure to help shift perceptions on EVs.

Supplementing product development with targeted marketing communications represents a multidimensional strategy for cultivating demand over the long term as evolving technologies better meet rising expectations. Addressing current deficiencies identified will support further market expansion prospects.

2.3.1.2 Consumer evaluation of supply level of electric vehicles

Distribution activities and support programs received average ratings of 3.5-3.8 points, indicating this is still a limitation despite networks developing in recent years. Consumers lack ample conditions, especially information access, when needing products. Authorities and manufacturers should implement incentivization to encourage EV adoption.

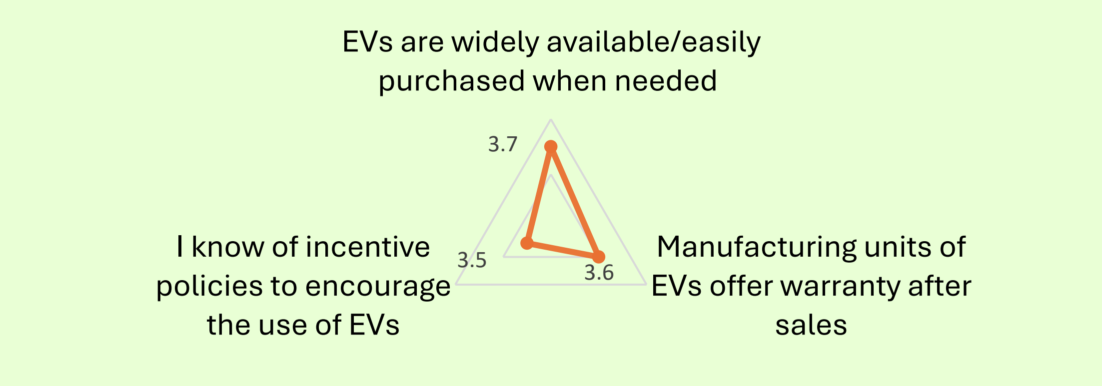


Figure 40: Consumer evaluation of supply level and accessibility of support activities for EVs

Developing comprehensive distribution requires substantial finances not all businesses can afford. Furthermore, relationships between businesses and agents face complications partly due to low societal EV acceptance, causing hesitancy in network expansions. This puts pressure on manufacturers and suppliers.

To distribute EVs, in addition to leveraging existing agent and store networks, manufacturers can consider directly investing in sales teams targeting high potential consumer clusters like schools and offices to stimulate demand.

Consumer trust in business after-sales/customer care also scored modestly at 3.6 points. This issue depends less on objective factors, allowing manufacturers to completely transform operating methods and build confidence. After-sales processes play a vital role through consistently handling product/service issues to ensure satisfaction with long-term EVs. Support like usage guidance, repairs, and warranties are especially important. Good after-sales services strengthen relationships. Fully resolving complaints to deliver positive experiences builds brand loyalty over time.

The Harvard Business Review has shown that finding new consumers is five to 25 times more expensive than selling a product to a group of people who have already consumed the product/service. Therefore, although the search for new consumers is an important task, at the same time, businesses cannot ignore their current group of consumers. For GKN products, consumers are primarily construction contractors, businesspeople and product entrepreneurs, but can also be investors of real estate projects with repetitive consumption characteristics. These consumers are key for businesses to develop sustainably when facing market challenges.

2.3.1.3 Consumer evaluation of economic benefits of electric vehicles

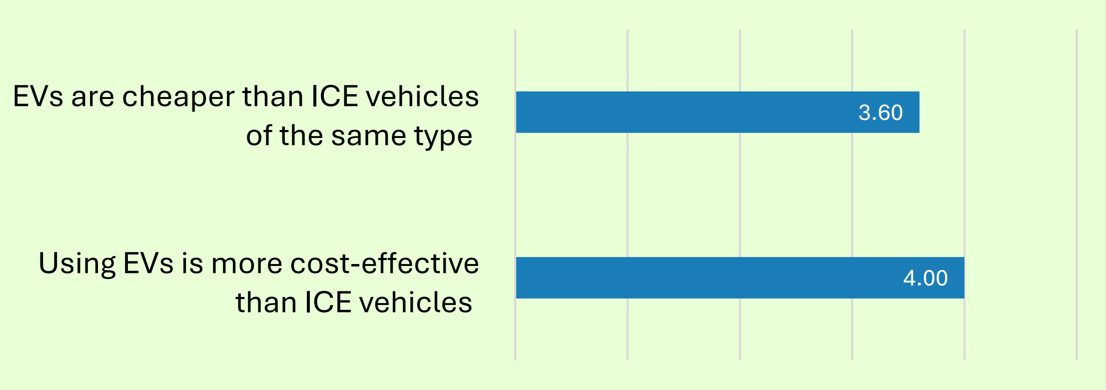


Figure 41: Consumer evaluation of economic benefits of EVs

Consumers disagreed that EVs are cheaper than comparable ICE vehicles, scoring this statement 3.6 points. Price heavily influences consumer product choices. Authorities must prioritize policy implementation and mechanisms supporting manufacturer investment via capital and tax incentives. This allows adopting advanced equipment/technology to reduce production costs. Lower costs enable developing appropriate pricing strategies and boosting EV competitiveness against gasoline equivalents. Both manufacturers and government need promotional policies incentivizing consumer EV selection alongside cost reductions.

Results indicate awareness of economic benefits from EVs as consumers agreed with EVs being more cost-effective over time. This cost advantage message could serve as an impactful promotional slogan in communications highlighting long-term savings to cultivate demand.

2.3.1.4 Consumer evaluation of environmental benefits of electric vehicles

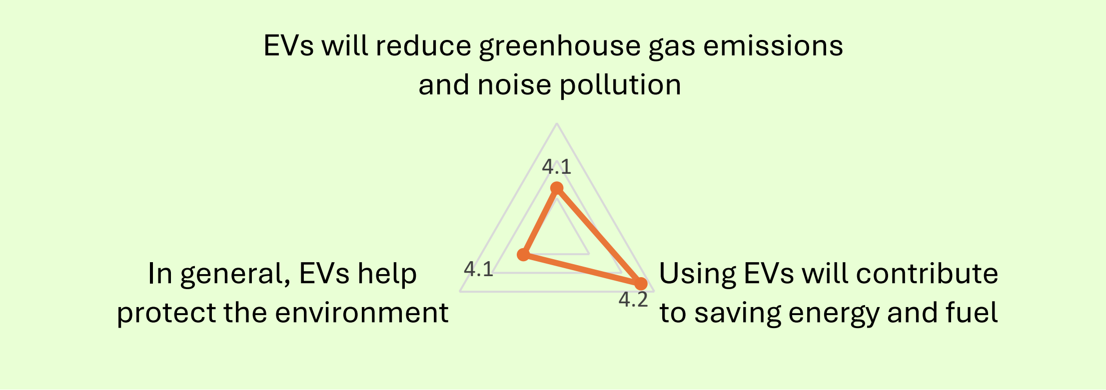


Figure 42: Consumer evaluation of environmental benefits of EVs

Of all evaluation statements, those regarding EVs' environmental benefits received the highest scores (scale of 1-5). This demonstrates consumers strongly recognize EVs' positive impacts on the environment such as reducing greenhouse emissions and noise pollution and contributing to saving energy and fuel.

Specifically, the survey found most consumers believe EVs reduce smog, carbon dioxide emissions, and noise pollution while improving air quality.

This aligns with expert opinions stating one major EV advantage is their environmental benefits. Without exhaust pipes, EVs limit emissions and reduce localized air pollution especially in dense cities.

Using electric motors also means smooth, noiseless operation. EVs thereby offer an effective solution for enhanced air quality, diminished noise pollution, and ultimately improved quality of life and public health according to available analysis.

The survey results reinforce EVs are widely seen as an environmentally-friendly alternative capable of delivering tangible health and well-being gains for society through emission reductions, cleaner atmospheres, and decreased sound contamination - important selling points for broader acceptance.

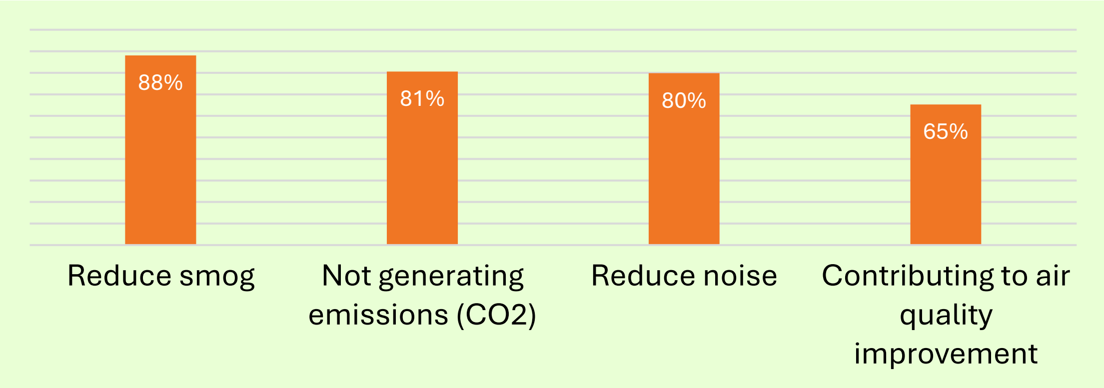


Figure 43: Agreement of consumers with the environmental benefits of EVs

2.3.1.5 Trust level of consumers in electric vehicles

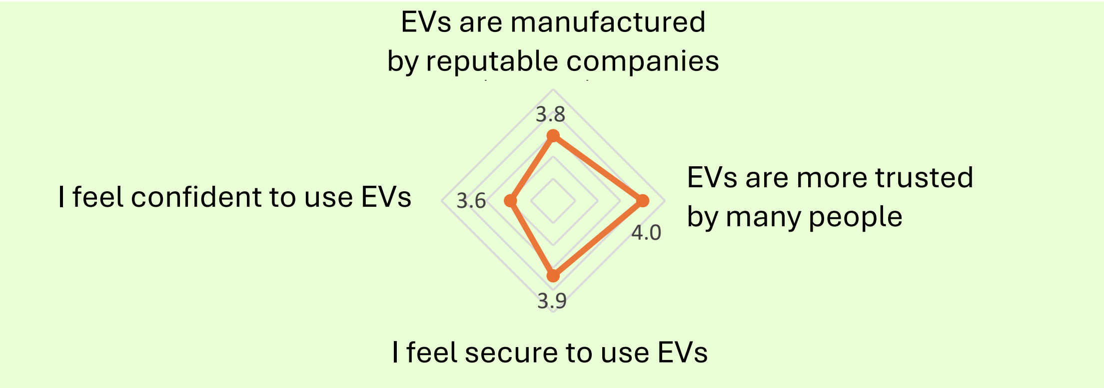


Figure 44: Trust level of consumers in EVs

While consumers recognize EVs' environmental/fuel efficiency benefits, evaluations of quality, design, features and supply activities have yet to fully instil confidence in EV usage. However, overall consumer trust in EVs and manufacturers remains quite positive. Statements regarding reputable production, widespread reliability, and security of use scored between 3.8-4 on a five-point scale.

Consumer trust and confidence lay an important foundation for favorable opportunities when implementing communication programs promoting EVs over ICE vehicles.

2.3.1.6 Satisfaction level of consumers with electric vehicles

Significant debate surrounds defining consumer satisfaction. Some researchers view it as expectations versus actual perceptions.

Bachelet (1995) described satisfaction as an emotional response to a product/service experience. Meanwhile, Oliva, Oliver and Beardon (1995) associated it with value received relative to previous purchases. Similarly, Oliver (1997) tied satisfaction to fulfilling wants. Zeithaml and Bitner (2000) argued it is meeting needs and requirements through an evaluation. Bringing further clarity, Kotler (2001) defined satisfaction as an emotional state resulting from comparing consumption outcomes against initial expectations.

Satisfaction arises from subjective evaluations formed based on product/ service knowledge and experiences in meeting needs. It represents a psychological feeling following need fulfilment. Consumers develop satisfaction through accumulated experiences, especially when purchasing and using offerings. They then compare realities to expectations in evaluating satisfaction levels.

Therefore, acceptance or possible disappointment stem from comparing actual benefits against pre-purchase forecasts. Post-purchase satisfaction depends on how received advantages align with prior estimations.

This understanding considers products and services, recognizing both tangible goods and intangibles. Fundamentally, satisfaction results from juxtaposing perceived benefits against anticipations. Miss-matches breed dissatisfaction, while alignments satisfy. Surpassing expectations enhances satisfaction further still.

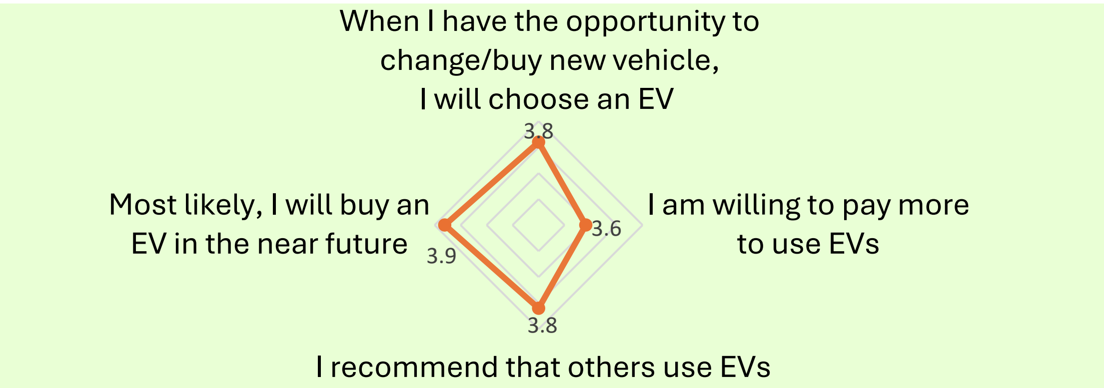


Figure 45: Satisfaction level of consumers with EVs

The survey found average satisfaction scores approached the agreed range (nearly four points on a five-point scale) for most factors. Notably, consumer agreement fell for "willingness to pay more for EVs," reflecting reluctance increasing expenses for such vehicles. While EVs have yet to exceed expectations, consumers may still opt for their use according to responses – presenting an opportunity to broaden the market. However, this also poses challenges for manufacturers to maintain strengths, retain buyers, expand target audiences, and ultimately realize the market potential through ongoing promotion of benefits.

2.3.1.7 General consumer evaluation of electric vehicles

The general EV evaluation showed environmental benefits received the highest scores from consumers (4.1 points), followed by economic benefits. These factors partially satisfy consumers by conferring competitive advantages versus ICE vehicles. However, current EV quality, design, features and supporting access services have yet to fully meet expectations.

In addition to promoting inherent advantages, manufacturers must put further efforts into supply activities like prioritizing quality, design and feature upgrades.

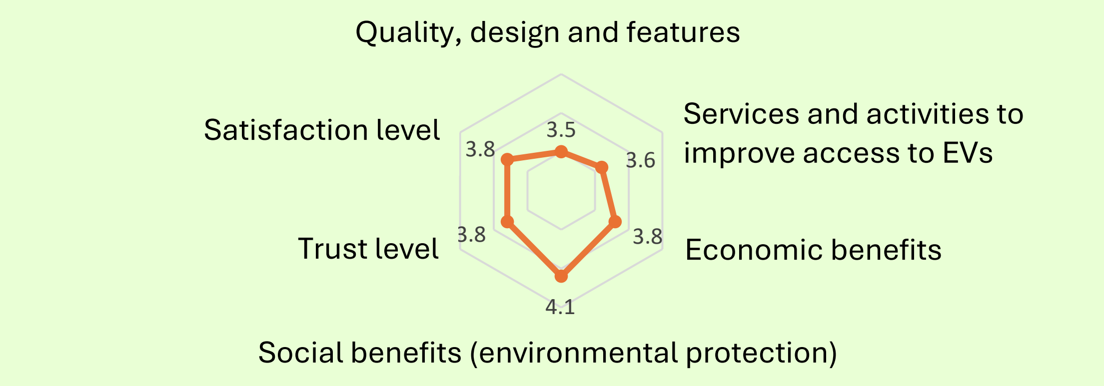


Figure 46: General evaluation of EVs

To capitalize on opportunities while overcoming challenges, specific strategies and action plans should be developed, such as:

- Maintain quality stability, ensure durability, and improve EV models/features through investments that regularly upgrade equipment/machinery and apply standardized modern technologies in production.
- Prioritize devising and executing strong consumer care and support programs, as this indicator currently ranks low with consumers.

- Develop an integrated communications plan to promote dissemination of information on EV benefits and brand images while fostering connections and interactions with consumers.

2.3.2 Advantages and disadvantages of electric vehicle development

Using EVs is becoming a global trend, so it is important to understand their advantages and disadvantages from the perspective of consumers.

2.3.2.1 Advantages of electric vehicles for consumers

Consumers chiefly recognized five outstanding EV advantages according to surveys: cost-effectiveness, convenience, fuel saving, environmental protection, and safety. Other benefits like aesthetics and novel experiences were less commonly identified, implying manufacturers should place more emphasis on highlighting these attributes.

Most survey respondents indicated cost and fuel savings as primary perks. Indeed, battery charging costs are over 10 times cheaper than fuelling equivalent ICE vehicles. Moreover, Vietnamese commonly use electric bicycles/motorbikes able to charge anywhere rather than refuelling stations, exemplifying convenience. Upfront EV pricing also undercuts gasoline equivalents.

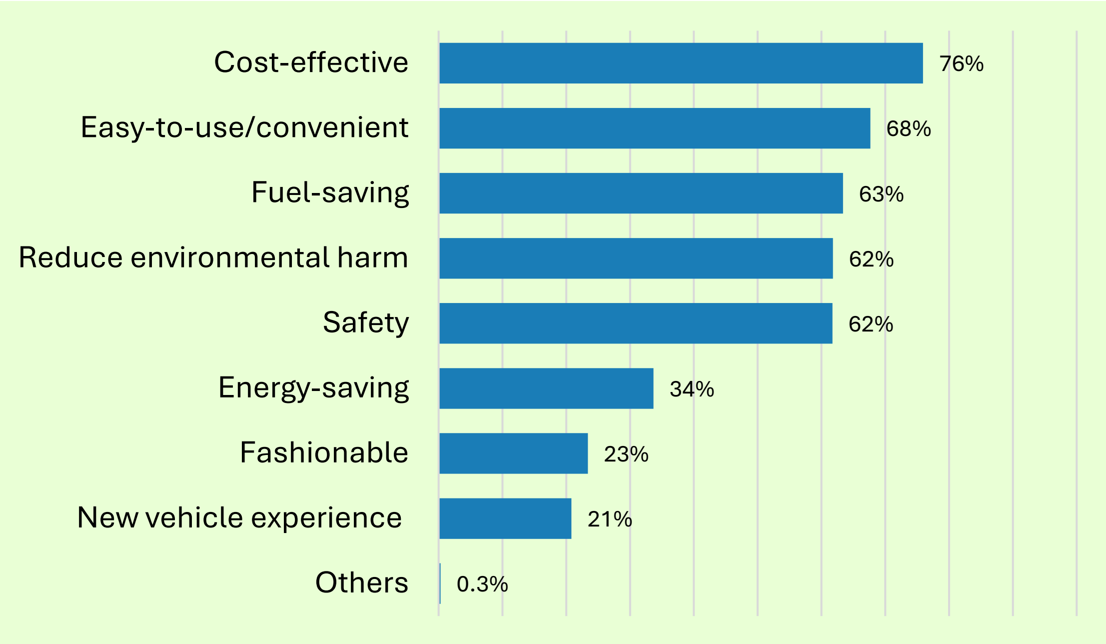


Figure 47: Comparative advantages of EVs

While Vietnamese consumers acknowledge EV benefits, greater awareness of their full scope and importance is still needed. Simultaneous policy incentives are also required to promote choosing EVs over fuel vehicles.

Awareness campaigns and preferential initiatives could synchronize to further stimulate consideration and uptake of EVs' array of economic, practical and environmental advantages.

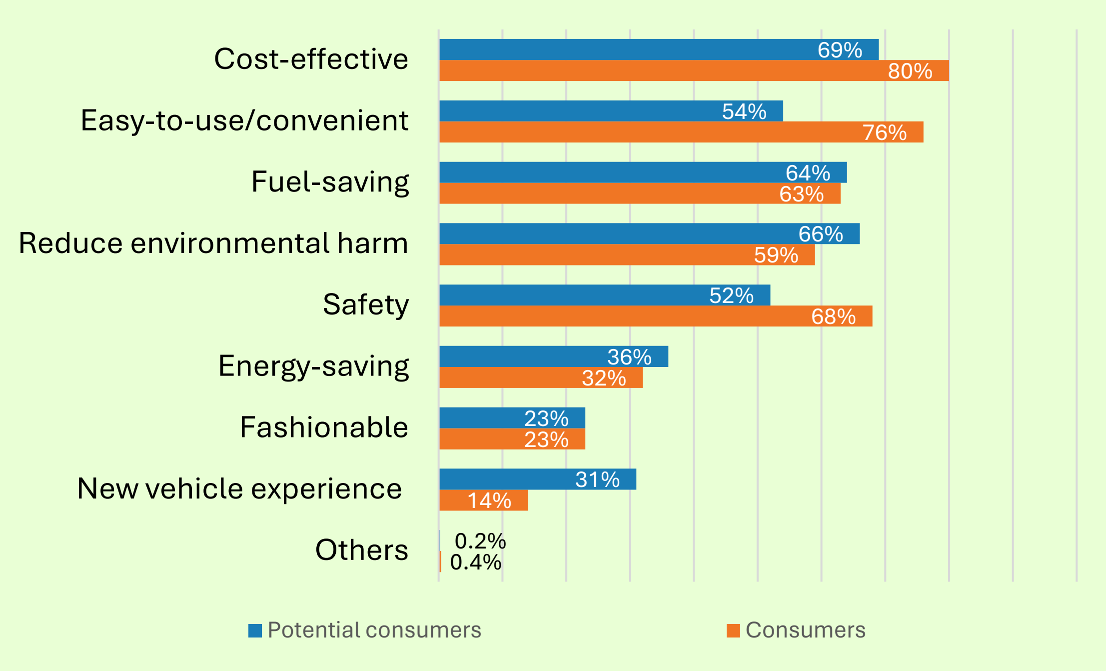


Figure 48: Comparative advantages of EVs (by consumer group)

Analysis of the perceived comparative advantages of EVs between consumer groups showed that there was not much difference between them. Overall, the group of consumers (i.e., those who already own/have already used EVs) has a higher rate of recognition for the advantages of EVs, including cost-effectiveness, convenience and safety. Meanwhile, the group of potential consumers has a higher rate of recognition for EVs' potential to reduce environmental harm and to provide a "new vehicle experience."

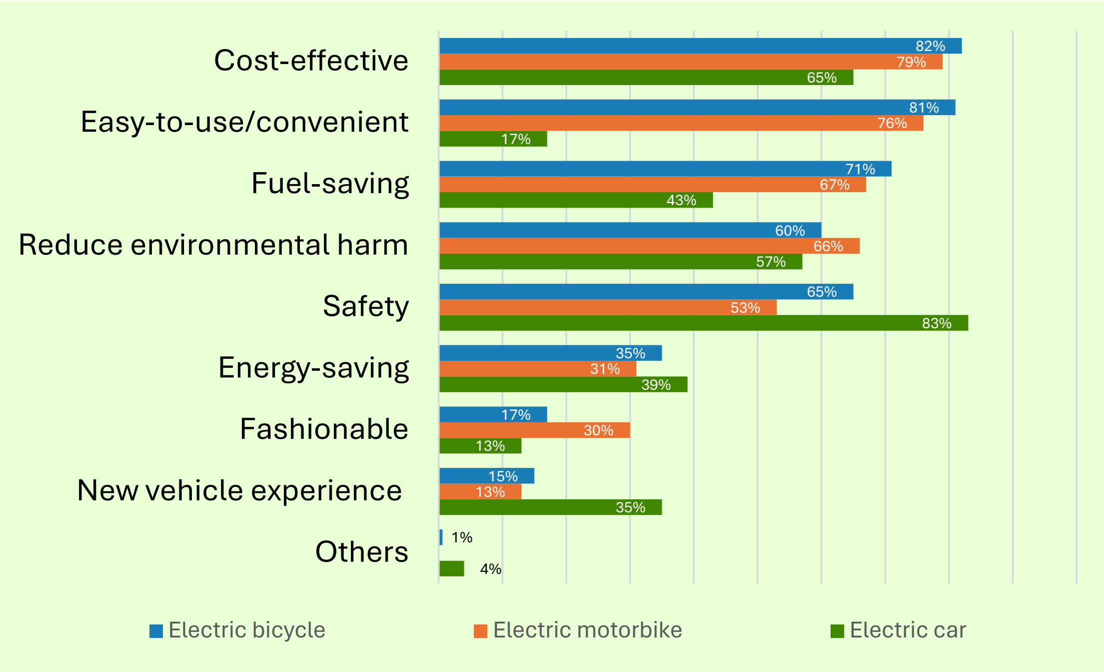


Figure 49: Comparative advantages of EVs (for consumers)

The survey revealed consumers using different EVs prioritize certain benefits. Those with electric bicycles and motorbikes more commonly selected cost-effectiveness, fuel savings, convenience, safety and fashion/aesthetics as advantages. Meanwhile, electric motorbike users displayed a higher propensity to identify environmental protection and novel vehicular experiences as benefits.

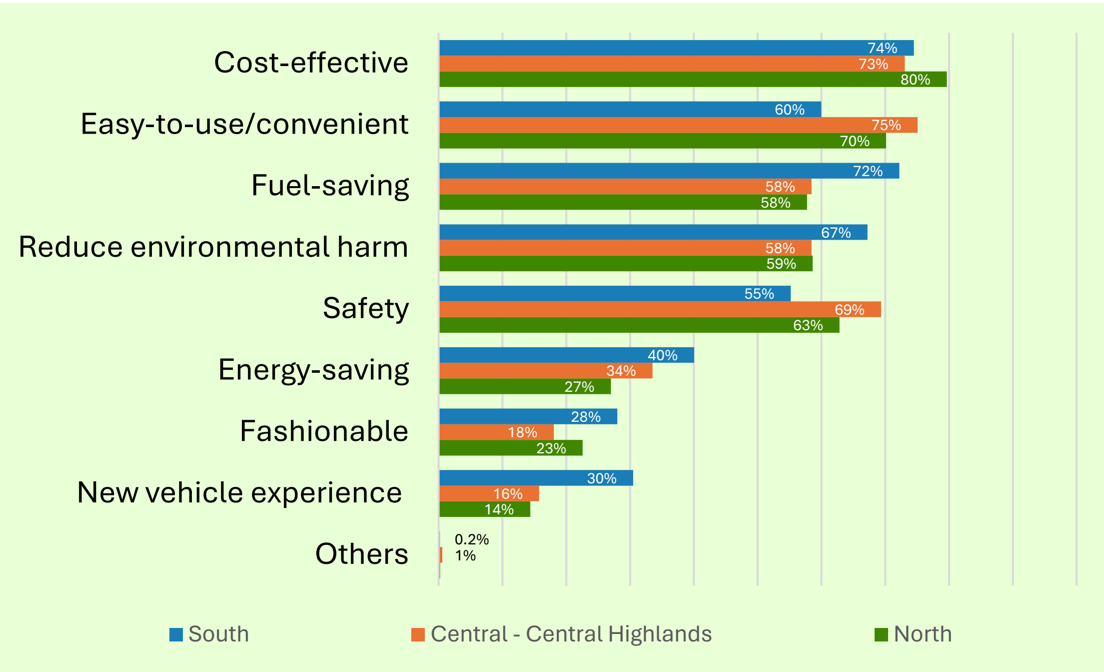


Figure 50: Comparative advantages of EVs by region

The survey found Southern consumers generally showed the highest rates in recognizing EV benefits, though differences compared to other regions remained modest. Northerners most prioritized cost-effectiveness as an advantage, while those in Central provinces/highlands more commonly saw safety and convenience as pros.

Analyzing perceptual variations between segments offers guidance in customizing outreach strategies and benefit messaging for each group of consumers.

2.3.2.2 Disadvantages of electric vehicles for consumers

Although there are a number of advantages brought by EVs, there are still some disadvantages.

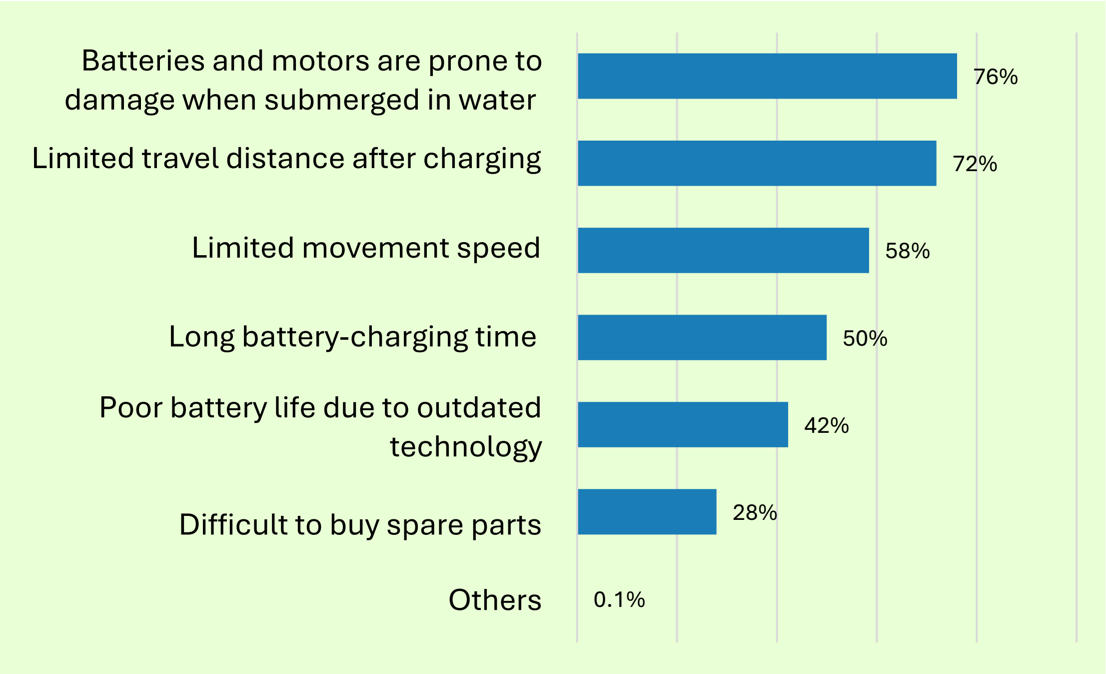


Figure 51: Comparative disadvantages of EVs (for consumers)

Surveys highlighted several EV disadvantages most commonly perceived by consumers. Between 50-76% noticed limitations involving batteries/motors vulnerable to water damage, constrained travel ranges per charge, slower movement speeds and prolonged charging durations.

Additionally, shorter battery lifespans and difficultly obtaining affordable replacement components posed issues for some. While manufacturers have worked to enhance EVs over time and appeal more, these persistent consumer-detected drawbacks impede greater popularity gains.

Most concerning was susceptibility of batteries and motors to water damage. Currently, electric bicycles and motorbikes offer closed engine configurations resisting splashes/rain but not full submersion, which risks immediate battery ruin, short-circuiting or fires.

Another constraint of EVs apparent in use relates to restricted range - a full charge offers approximately 50-100km depending on vehicle type, requiring 7-8 hours for replenishment. This inability to continuously travel great distances renders EVs unsuitable when long trips are required, like for travel, sightseeing or festivals. It also diminishes confidence in traffic jams.

Additionally, over half of respondents highlighted EVs' limited travel speeds as an issue. Electric bicycles and motorbikes popular among Vietnamese typically max out around 50km/h. This precludes users from accelerating to higher velocities mandated on roads outside residential zones. Addressing such limitations will be key to broadening appropriate scenarios for EV utilization.

Extended charging times versus rapid refuelling of gasoline cars pose an inconvenience, as EVs typically require 7-8 hours for a full replenishment compared to 5-10 minutes. Additionally, concerns over limited battery lifespan and repair difficulties deter many consumers due to EVs' unfamiliarity in Vietnam. This is compounded by a lack of designated maintenance facilities.

Experts note accompanying EV services in Vietnam remain underdeveloped, and infrastructure expansion alone will prove challenging without coordinated investments in electric vehicle promotion and production technologies.

To address both internal constraints raised by consumers and external factors, focused efforts are needed from manufactures including infrastructure spending, production improvements through advanced technologies, and robust after-sales support like warranties and widespread maintenance access.

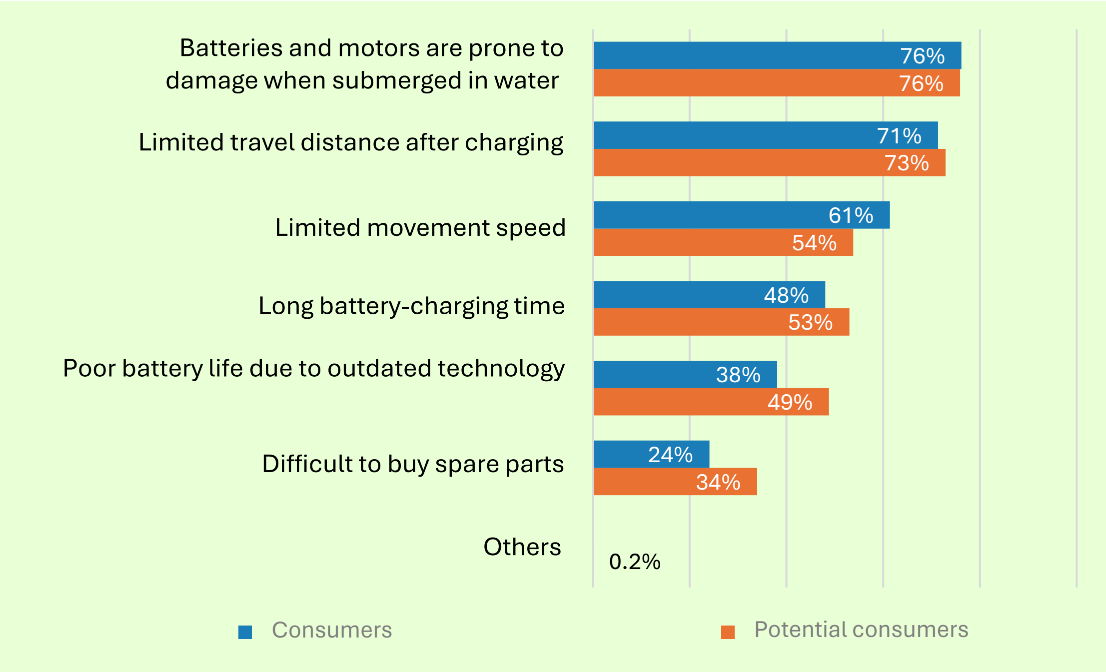


Figure 52: Comparative disadvantages of EVs by consumer group

Minimal differences existed between consumer segments, with a couple exceptions. Compared to potential customers, current EV users expressed relatively greater concern over limited travel speeds. Meanwhile, potential consumers demonstrated more apprehension than users regarding long charging durations, battery lifespan, and difficulties procuring spare parts/components.

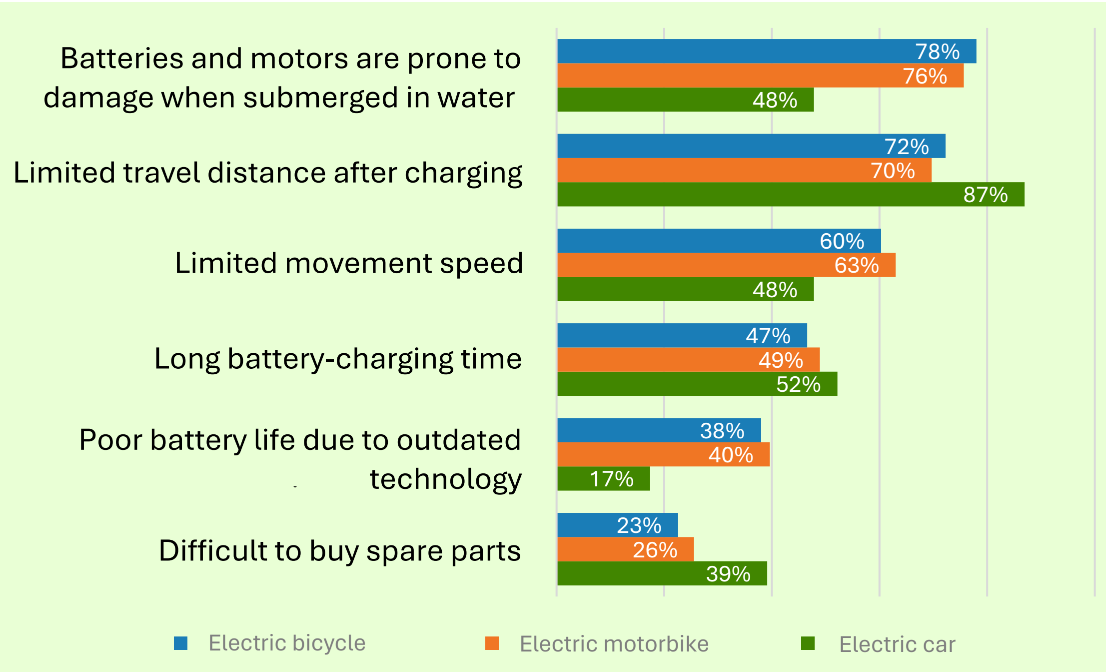


Figure 53: Comparative disadvantages of EVs by vehicle type (for consumers)

Electric bicycle and motorbike users expressed greater concern with battery/motor vulnerability to water damage, constrained speeds and battery lifespan. Meanwhile, electric car owners prioritized range per charge and lengthy charging durations.

Manufacturers should address general EV drawbacks while prioritizing limitations specific to each type based on user perception. In addition to internally-generated constraints voiced by consumers, external barriers inhibiting broader adoption also exist. Overcoming both internal product-related and external environment obstacles will be key to advancing widespread electric mobility.

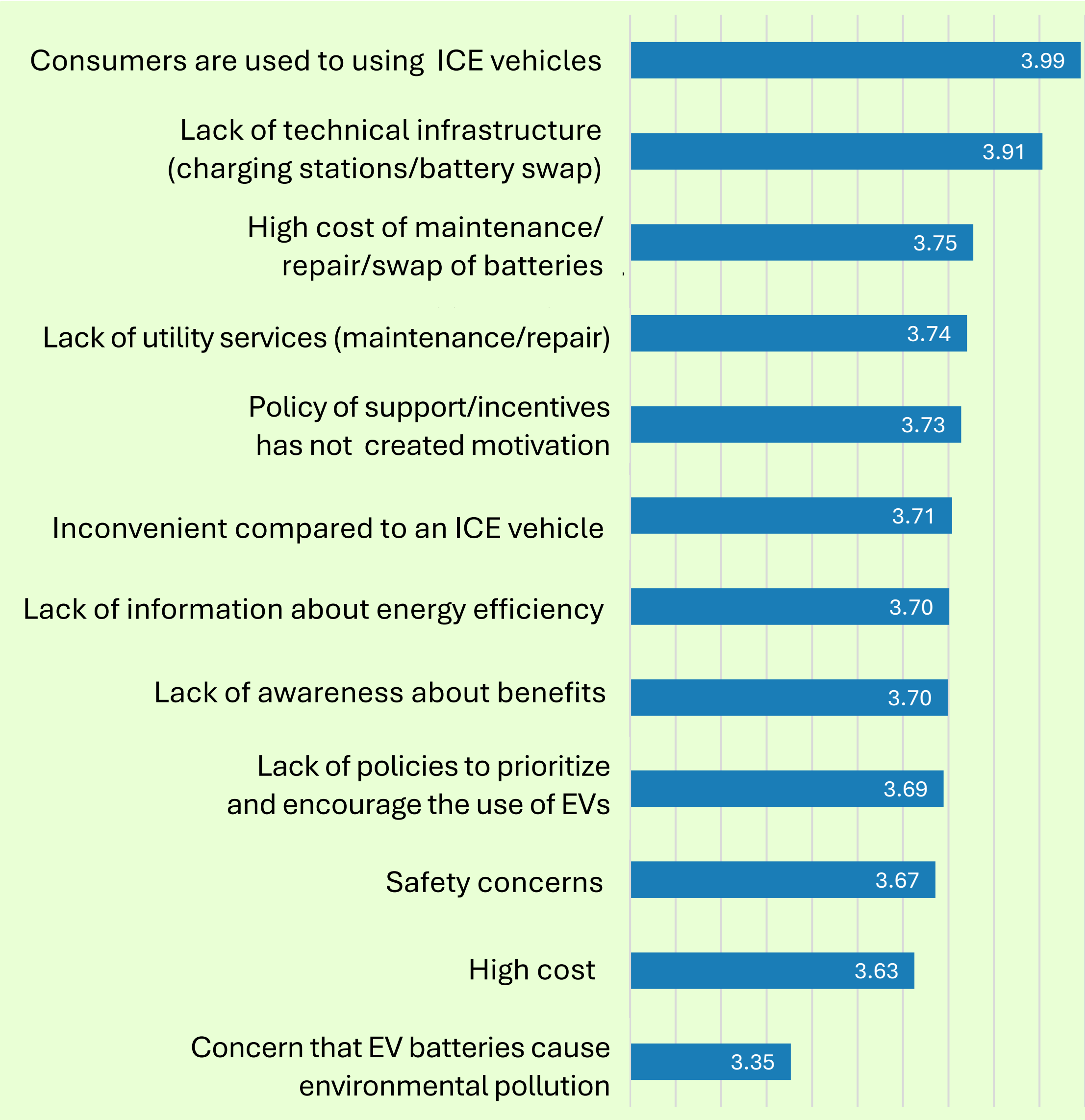


Figure 54: Barriers to widespread adoption of EVs

Survey results identified two primary barriers to EV development in Vietnam: ingrained ICE vehicle usage habits and inadequate technical infrastructure like charging/battery swap stations. Other evaluated inhibitors exerted less hindrance relative to these chief impediments and involved comparable concerns. Left unaddressed, all such obstacles would collectively interfere with EV progress.

The group of consumers who have not yet had a need to use EVs were also surveyed about the reasons why consumers do not like or do not want to use EVs.

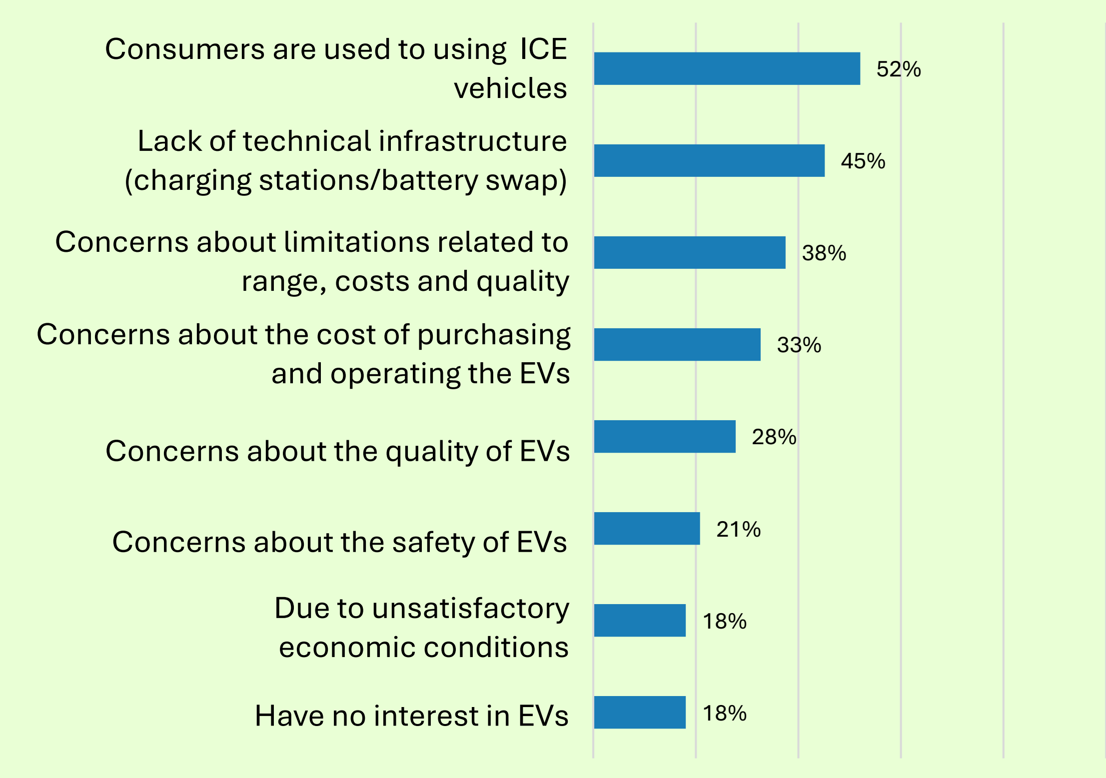


Figure 55: Reasons for not using EVs

Survey results illuminated key barriers preventing wider EV adoption. Over 50% of potential consumers cited familiarity with ICE vehicles and lack of supporting infrastructure as top deterrents. Approximately 30% also expressed concerns regarding range, costs and quality. Some worried about safety, financial feasibility or disinterest in EVs. These perspectives aligned closely with obstacles identified by current users, demonstrating similarities between segments.

While EVs offer advantages, intrinsic limitations and objective consumer-perceived impediments persist. Surmounting these barriers necessitates coordinated efforts. Public and private collaboration must drive application of innovative production technologies. Infrastructure and services must be expanded through targeted investments. Incentive policies aim to encourage electric option selection.

2.3.3 Consumer expectations on promoting and enhancing policy of using electric vehicles

2.3.3.1 Consumer proposals to state management

Statistical results on consumers' expectations and policy recommendations once again show their interest in using EVs.

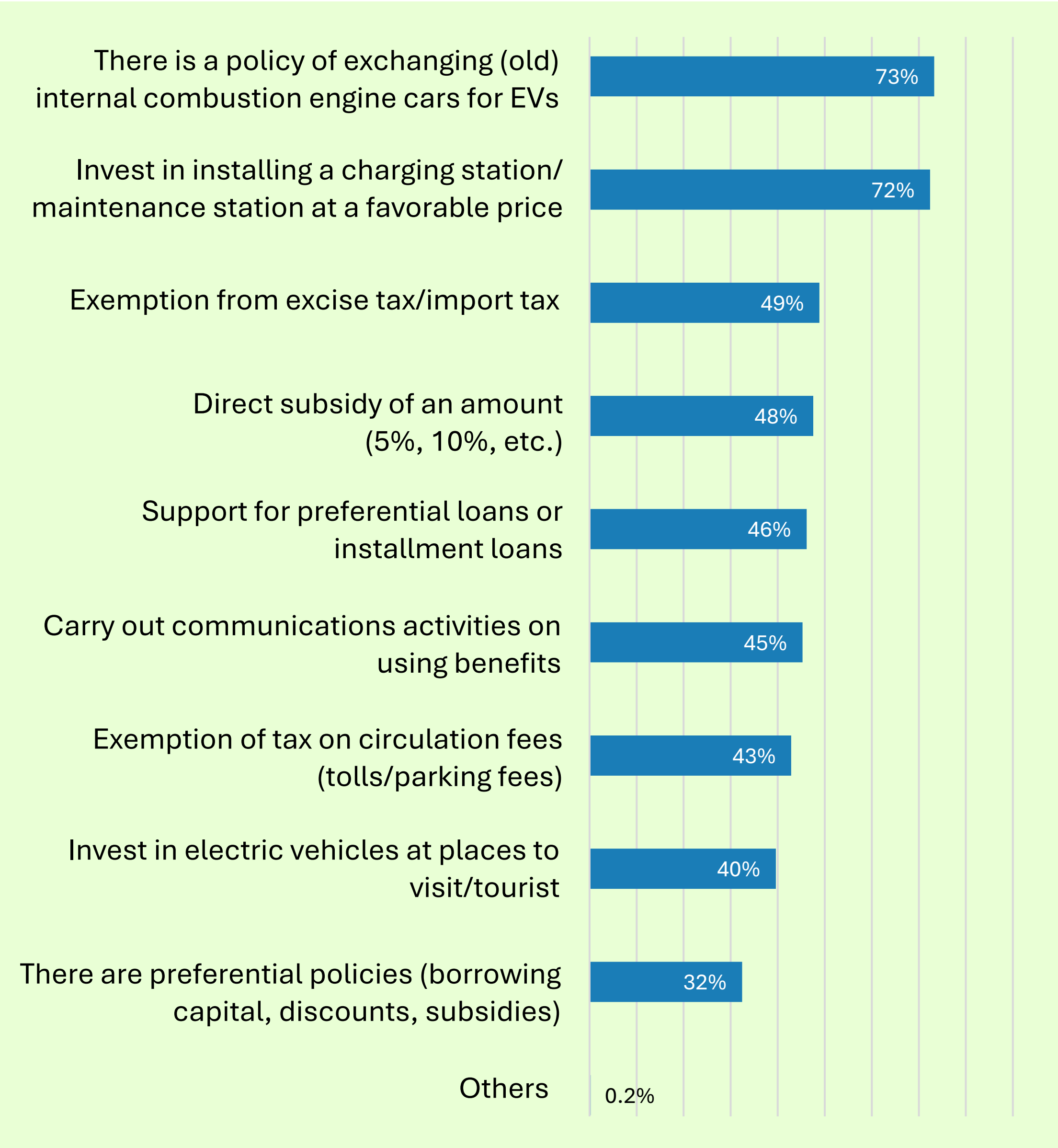


Figure 56: Proposals of consumers to state management

The policy priority selected by over two-thirds of respondents and proposed to management was an ICE vehicle trade-in program offering preferential EV prices.

Ranking next were suggestions for budget subsidies, excise tax exemptions or purchase loans with reduced interest rates, coupled with outreach highlighting EV benefits - endorsed by nearly 50% of surveyed consumers. Additionally, 40% proposed the state enable EV trial experience investment at tourist sites, allowing free test drives. Finally, converting rental fleets to EVs surfaced as a preferential recommendation through provider loans and subsidies.

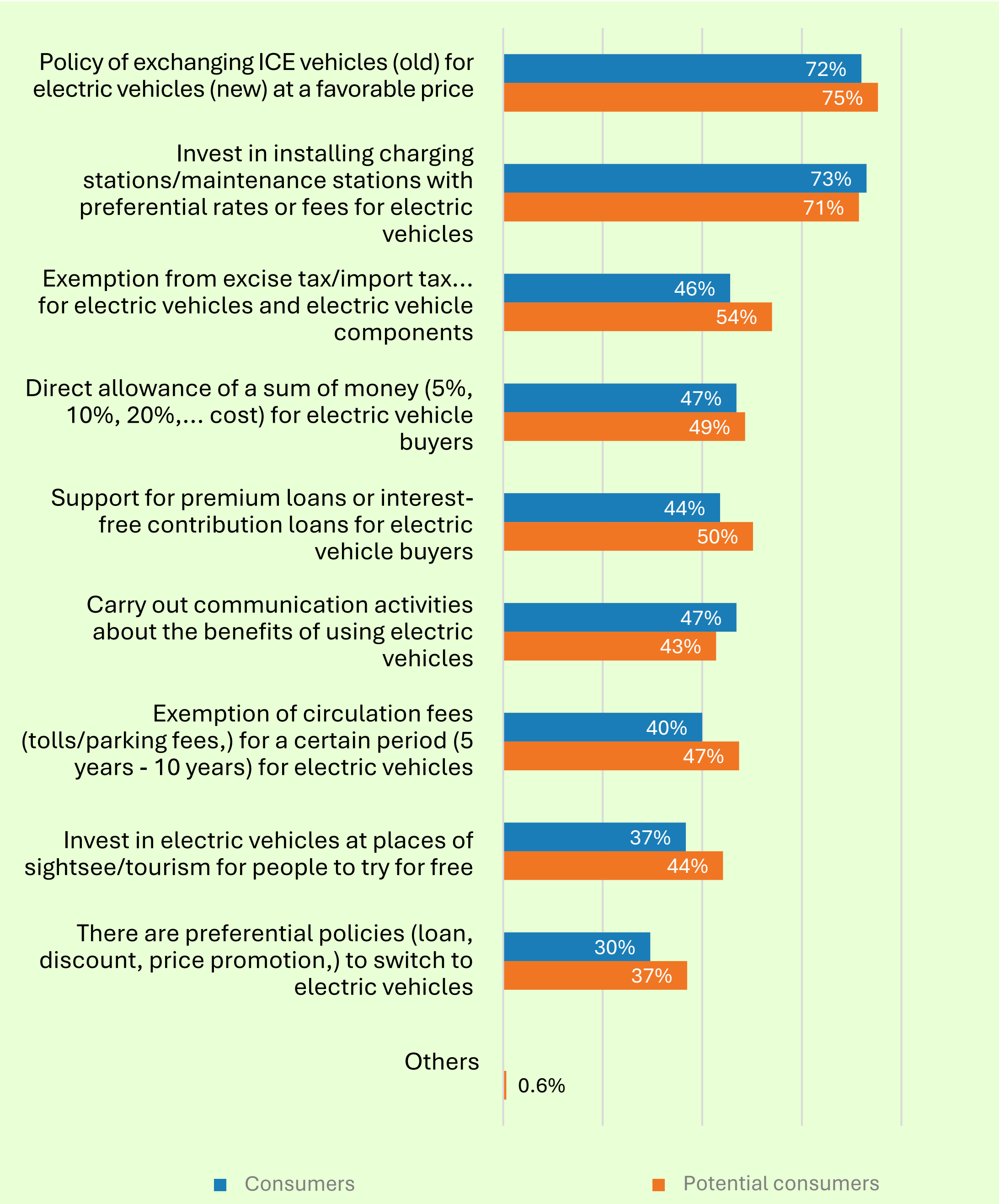


Figure 57: Proposals of consumers to state management

Analysis revealed minimal variation in policy proposals across consumer segments. Excepting potential customers, current EV users expressed preferences at a relatively higher rate for most recommendations.

Specifically, those with direct EV experience placed comparatively more emphasis on infrastructure investment policies like developing charging networks and servicing/maintenance provisions.

2.3.3.2 Consumer proposals to manufacturers and suppliers of EVs

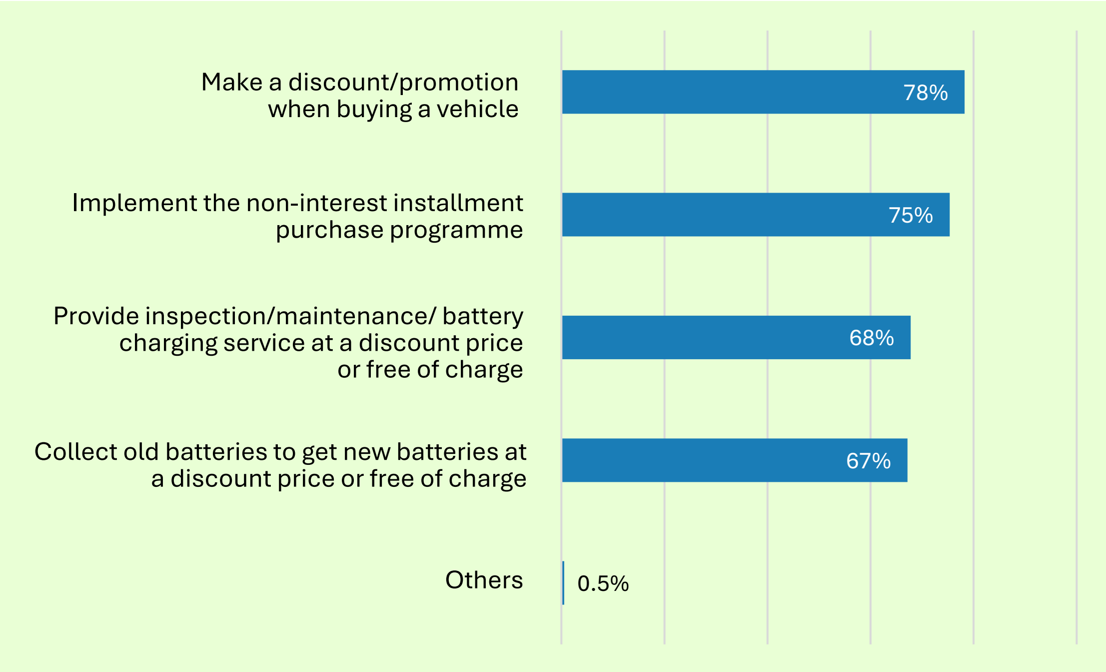


Figure 58: Proposals of consumers to BSN

Consumer proposals to the manufacturers and suppliers of EVs focus more on policies related to distribution activities such as discounting, promotion when purchasing EVs or implementing an instalment purchase programme without interest for the majority of proposed consumers (with the rate of 78 percent and 75 percent, respectively).

Next, it is proposed that manufacturers focus on providing maintenance, battery charging and battery replacement services for users of EVs at long-term preferential costs (over 10 years) or free of charge.

In recent years, manufacturers have paid attention to investing in upgrading and significantly improving the quality of vehicles, but the services provided are still limited and have not paid attention to proper investment. Consumers suggest that manufacturers pay more attention to investing in supply services and support services to improve accessibility to and convenience of EVs. There is not much difference between consumer segment groups in terms of expectations for enterprises.

2.4 BEHAVIOURS AND HABITS OF CONSUMERS USING ELECTRIC VEHICLES

2.4.1 Behaviours of consumers using electric vehicles

2.4.1.1 Factors when selecting electric vehicles

Consumers choose products based on many different factors, and socioeconomic considerations greatly influence consumption and perspectives of consumers on EVs.

In order to measure the importance of factors for choosing to purchase EVs, the survey team used a normative scale, with a scale of five (where one is not important at all and five is very important).

Figure 59: Factors when selecting EVs

The survey results show that safety and battery life/technology are the two most important factors when consumers choose EVs. Next, durability, travel distance, cost and charging time are of high concern for consumers.

Reasonable price is a factor that consumers consider very important when choosing EVs. In order for EVS to be able to compete with ICE vehicles, businesses also need to pay attention to building an appropriate price policy to attract consumers. In addition, the factors of operating costs, maintenance services and energy consumption per unit of distance are also factors that consumers are very interested in when choosing EVs.

The factors to reduce environmental pollution, infrastructure for the EVs, features of the EVs, and the speed of travel are evaluated as important by consumers when choosing an EV. Therefore, in addition to investing in building technical infrastructure to meet the convenience of operation and use and applying technology to improve the features and speed of vehicles, communication on the benefits of environmental benefits brought about by EVs is also very important.

Factors related to sales support activities, providing services of EVs are the final concern of consumers. Due to the characteristics of consumption, EV is often not covered as widely as other common products, but only concentrated at large agents that meet the conditions of investment capital, warehouses and transportation services. In order for consumers to easily access and use EVs in the current conditions, in addition to investing in expanding distribution networks, businesses need to pay attention to implementing promotions and discounts to attract consumers. On the other hand, building a strong sales team in each region and location with a high concentration of potential consumers for marketing and consulting on developing the EVs market.

There is not much difference between consumers segment groups in evaluating the importance of factors for choosing a market, except for the difference in the evaluation of consumers is different regions: consumers in the Central – Central Highlands region evaluate the importance of all the selection factors the highest, followed by consumers in the South and finally the consumers in the North rated the importance of factors for choosing EVs with lower scores.

EV selection criteria	North	Central – Central Highlands	South
	Mean	Mean	Mean
Battery life/technology (type)	4.0	4.6	4.4
Safe to use	4.1	4.5	4.3
Reliability	4.1	4.4	4.2
Distance travelled after each charge	4.0	4.4	4.3
Price	4.0	4.3	4.3
Fast battery-charging time	3.9	4.4	4.2
Operation/maintenance costs	3.9	4.3	4.2
Warranty service/maintenance/repair	3.9	4.3	4.2
Power consumption per unit distance travelled	3.7	4.3	4.3
Reduce environmental pollution	3.8	4.3	4.1
Infrastructure for EVs (charging stations/battery swap)	3.7	4.2	4.2
Utilities/features of EVs	3.8	4.2	4.0
Travel speed (cc)	3.7	4.2	4.0
Origin	3.5	4.1	3.9
Support packages/stimulus incentives	3.6	4.1	3.8
Supply service (sale)	3.5	4.0	3.9
Trademarks/brands	3.5	4.0	3.8

Design style/colour	3.7	3.9	3.7
Promotion/discount programmes	3.5	4.0	3.8

2.4.1.2 Price that consumers are willing to pay for electric vehicles

Price has a great influence on the decision to purchase any goods or services, and the decision to purchase an EV is no exception. The lower the price, the easier it is to sell goods and vice versa, however the quality of the product also plays an important role. These two factors together affect the demand for a good.

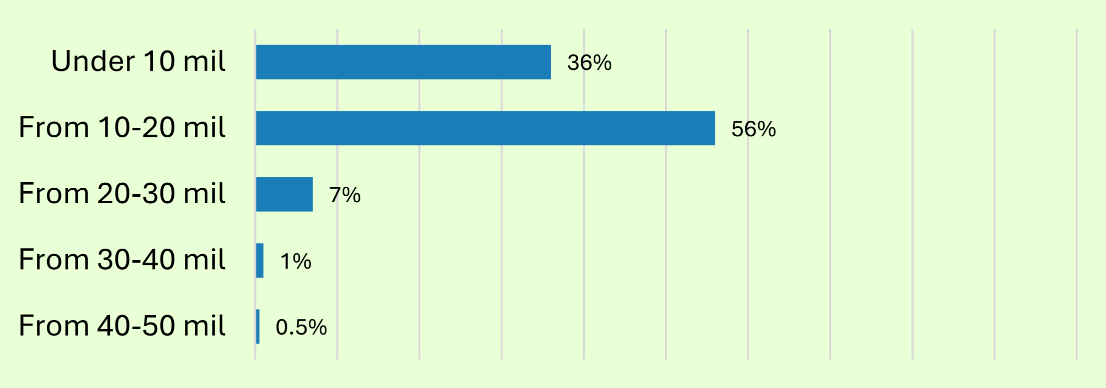


Figure 60: Price that consumers are willing to pay for electric bicycles (VND)

The survey results on the price that consumers accept to purchase an electric bicycle show that the majority of consumers suggest the price they consider appropriate to purchase an electric bicycle in the range of VND 10 million to VND 20 million (56 percent). Next, 36 percent of consumers proposed a price below 10 million VND. Also, about 8 percent of consumers proposed a price of over VND 20 million.

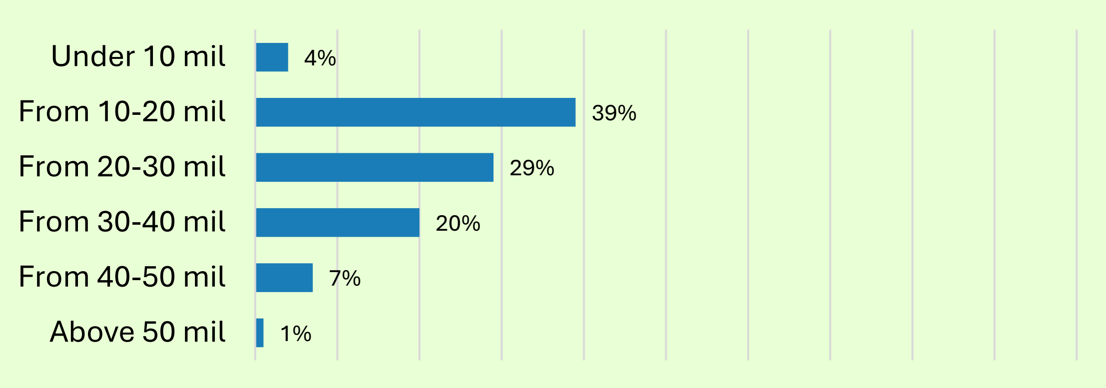


Figure 61: Price that consumers are willing to pay for electric motorbikes (VND)

The survey results on the price that consumers are willing to pay for electric motorbikes show that 49 percent of consumers said that they would pay between 20 million and 40 million VND, while 39 percent of consumers indicated that for them, a suitable price for an electric motorbike would be between 10 and 20 million VND. About 8 percent of consumers said that they would pay more than 40 million for an electric motorbike.

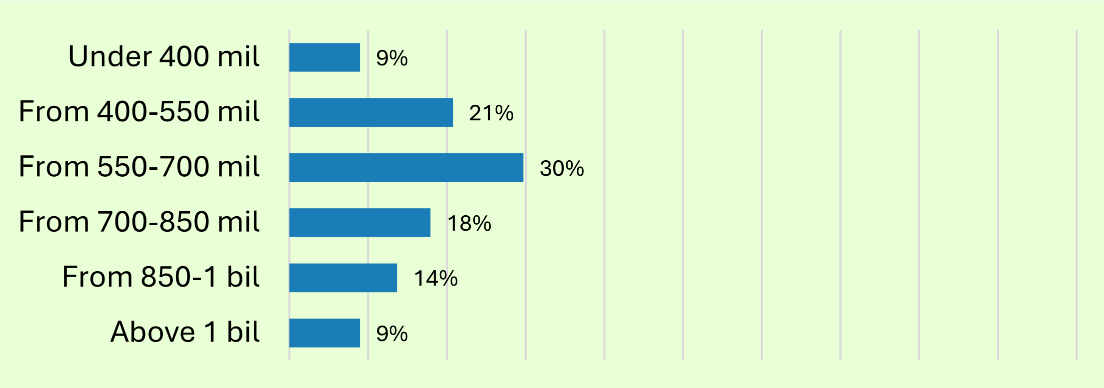


Figure 62: Price that consumers are willing to pay for electric cars (VND)

For electric cars, nearly one third of the people surveyed said that they would pay between 550 million and 700 million VND. Furthermore, 21 percent would pay between 400 million and 550 million VND, 18 would pay between 700 million and 850 million VND and 14 percent would pay between 850 million to 1 billion VND. There are also some consumers who think that the appropriate price for electric cars is under 400 million or over 1 billion (nine percent for each of these two groups).

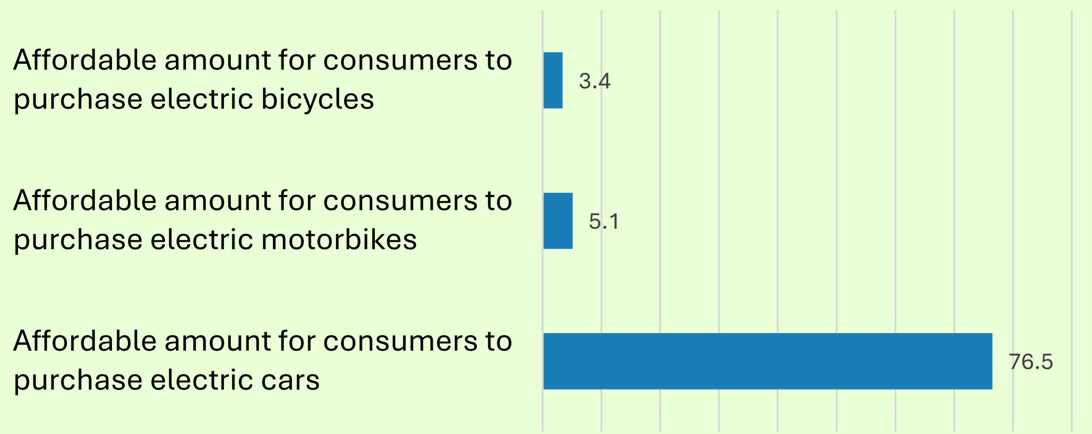
Thus, it can be said that the price of electric bicycles suitable for the majority of consumers in the current market is in the range of 10 to 20 million VND (56 percent). In comparison, for electric motorbikes it is between 10 and 40 million VND (88 percent) and for electric cars it is from 550 million to 850 million VND (48 percent).

However, there are also a small number of consumers who propose prices that are higher or lower than those proposed by the majority of consumers. Therefore, in addition to pricing products to meet the needs of the majority of consumers in the market, manufacturers should also pay attention to product diversification in terms of designs and models, especially the features of EVs corresponding to different prices to meet the needs of consumers in different market segments, through which enterprises take advantage of competitive advantages (even niche markets).

There is not much difference between consumer segments in terms of expected prices for different types of EVs, except that as might be expected, consumers from lower income households account for a larger proportion at lower prices and consumers from households with higher income levels account for a larger proportion at correspondingly higher prices. It can be inferred that expectations of consumers about the prices of different types of EVs are proportional to household income.

2.4.1.3 The additional amount that consumers are willing to pay for EVs

The research team used a question to determine how much more consumers are willing to pay to use an EV relative to an ICE vehicle.



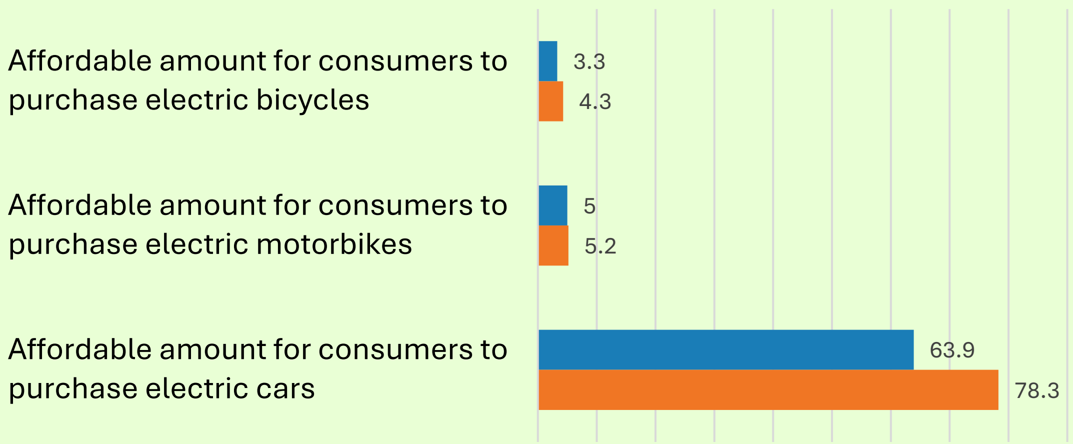
	Affordable amount for consumers to purchase electric cars	Affordable amount for consumers to purchase electric motorbikes	Affordable amount for consumers to purchase electric bicycles
(in million dong)	76.5	5.1	3.4

Figure 63: Consumers willing to pay extra to purchase EVs (million VND)

The survey results show that consumers are willing to pay, on average, an extra VND 3.4 million for an electric bicycle, an extra VND 5.1 million for an electric motorbike, and an extra VND 76.5 million for an electric car.

Part of the reason why consumers are willing to pay extra to use EVs is due to their environmental benefits, which are now recognized by the majority of consumers. According to a report conducted by market research company Nielsen, a survey of "global luxury trends" in 2016 also showed that consumers are willing to pay more for products with outstanding features; this includes being environmentally friendly, with the majority of consumers willing to pay more at two levels (53 percent highly willing and 44 percent willing).

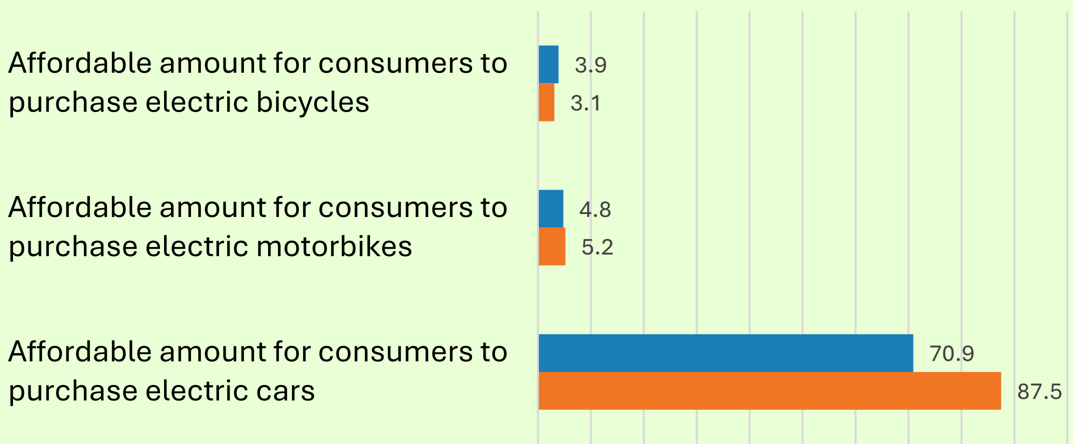
The positive attitude of consumers (willing to pay extra to use EVs) opens up opportunities for state management agencies and businesses to implement communication programmes to promote and increase the use of EVs.



	Affordable amount for consumers to purchase electric cars	Affordable amount for consumers to purchase electric motorbikes	Affordable amount for consumers to purchase electric bicycles
Consumers	63.9	5	3.3
Potential Consumers	78.3	5.2	4.3

Figure 64: Consumers willing to pay extra to purchase EVs by consumer group (million VND)

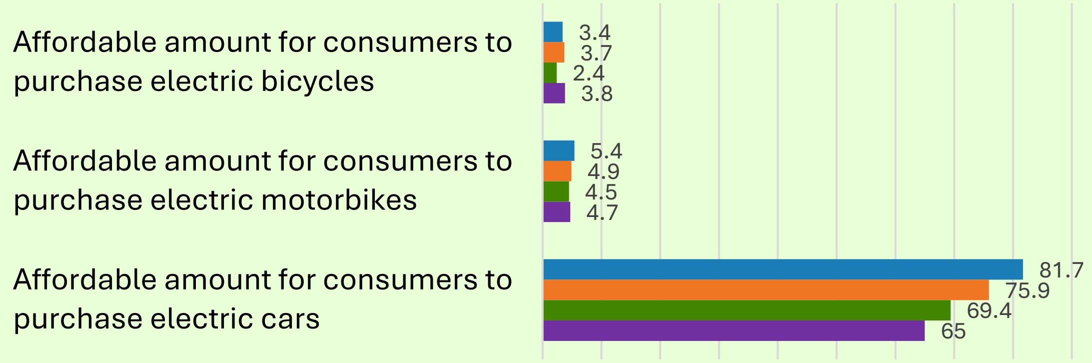
The results of the analysis by consumer segment show that the group of potential consumers is more likely to pay extra to purchase EVs than the group of consumers.



	Affordable amount for consumers to purchase electric cars	Affordable amount for consumers to purchase electric motorbikes	Affordable amount for consumers to purchase electric bicycles
Male	70.9	4.8	3.9
Female	87.5	5.2	3.1

Figure 65: Consumers willing to pay extra to purchase EVs by gender (million VND)

The results of the analysis by consumer segment show that women are more likely to pay extra to purchase EVs than men.



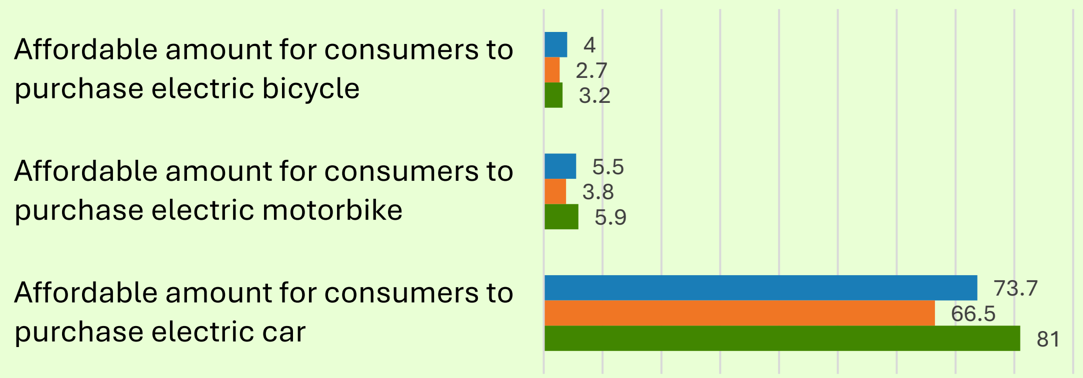
	Affordable amount for consumers to purchase electric cars	Affordable amount for consumers to purchase electric motorbikes	Affordable amount for consumers to purchase electric bicycles
Gen Z (under 28)	81.7	5.4	3.4
Gen Y (from 28-42)	75.9	4.9	3.7
Gen X (from 43-57)	69.4	4.5	2.4
Elder gen (above 57)	65	4.7	3.8

Figure 66: Consumers willing to pay extra to purchase EVs by generation (million VND)

	Affordable amount for consumers to purchase electric cars	Affordable amount for consumers to purchase electric motorbikes	Affordable amount for consumers to purchase electric bicycles
Below college	68.3	3.5	2.6
College/university students	54.4	5.3	4.2
College/university graduates	78.2	5.8	3.9
Higher education	87.2	7.6	5.5

Figure 67: Consumers willing to pay extra to purchase EVs based on education level (million VND)

In addition, the analysis results by consumer segment show that the trend of young, highly educated consumers are more likely to pay extra to purchase EVs than the group of elder consumers with a lower education level. In other words, the ability to pay to purchase EVs is directly proportional to education level and inversely proportional to the age of consumers.



	Affordable amount for consumers to purchase electric car	Affordable amount for consumers to purchase electric motorbike	Affordable amount for consumers to purchase electric bicycle
North	73.7	5.5	4
Central – Central Highlands	66.5	3.8	2.7
South	81	5.9	3.2

Figure 68: Consumers willing to pay extra to purchase EVs based on regions (million VND)

The results of the analysis by region show that consumers in the South have the ability to spend more to purchase EVs, followed by consumers in the North and finally, consumers in the Central - Central Highlands region.

2.4.1.4 Place to purchase electric vehicles

In addition to choosing a good product, suitable for needs, consumers are also care for and consider choosing the right place to purchase, ensuring quality and choosing a reputable seller.

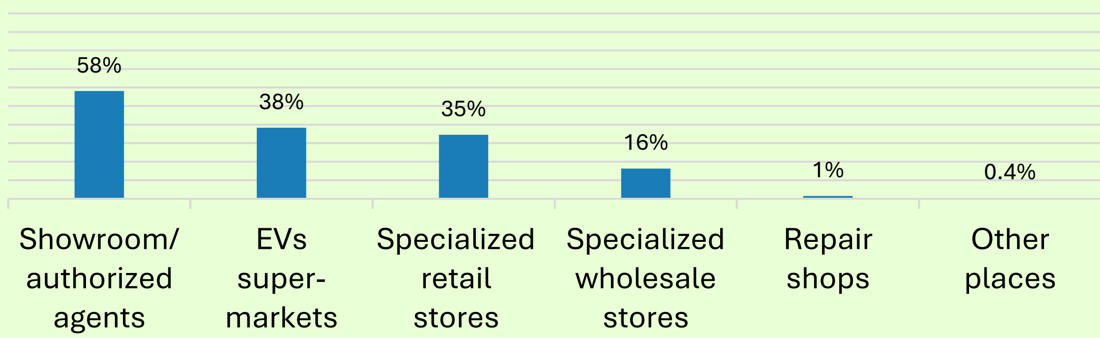


Figure 69: Rate of consumers choose places to purchase EVs

Distribution channels are selected by consumers based on product consumption characteristics and distribution levels of different types of EVs. Showroom/exclusive distribution agent of EVs of the manufacturer is the selling point that consumers mostly come to purchase EVs with the rate (58 percent).

Next are supermarkets selling EVs (38 percent) and specialized retail stores (35 percent) or specialized wholesale stores (16 percent). There are a small number of consumers who purchase old EVs at repair shops or directly from people who used it.

The choice of places for consumers to purchase EVs suggests for businesses to build a distribution strategy in the right direction; create convenience for consumers to access products of the businesses.

In general, for various types of EVs with durable consumption characteristics and not yet the most popular type of vehicle for consumers, distribution activities also need to be organized and operated differently to be profitable in attracting consumers. Businesses need to focus on exploiting distribution channels with direct interaction from businesses such as showrooms or authorized agents.

On the other hand, in response to the current trend of multi-channel shopping of consumers, enterprises should also take advantage of intermediate distribution channels to better meet the expectations of all consumers.

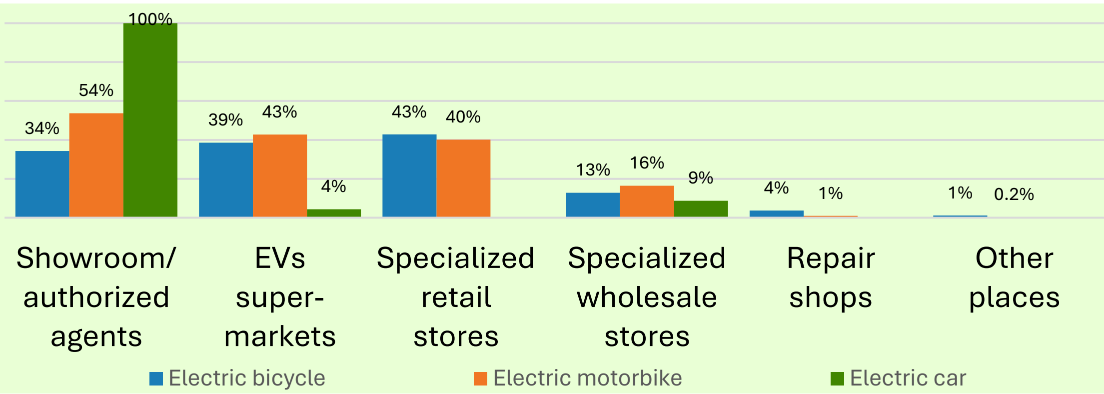


Figure 70: Locations at which EVs are purchased by EV type

Depending on the type of EVs, consumers will choose different purchase points. For electric bicycles and electric motorbikes, consumers can choose to purchase them at showrooms, authorized agents or at specialized stores. Meanwhile, for cars, 100 percent of consumers choose to purchase directly from the manufacturer or authorized distributor. The graph of the above survey results shows that, the higher the (economic) value of EVs, the more showrooms and authorized agents are preferred by consumers over other distribution channels.

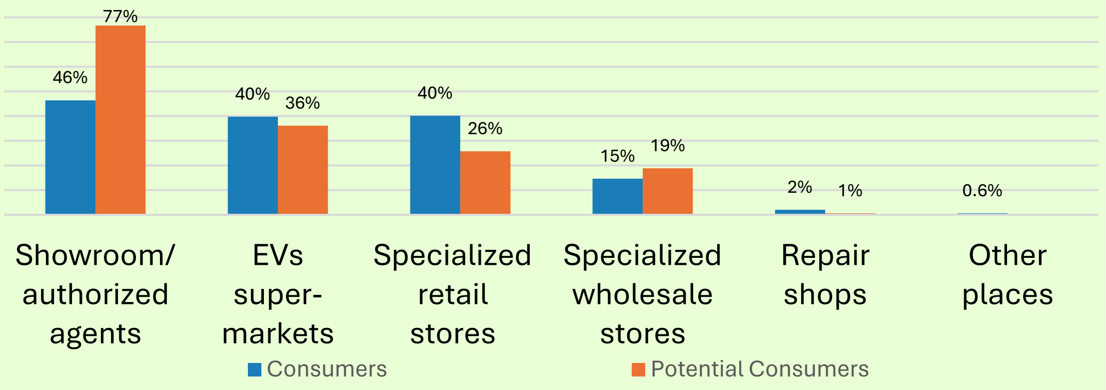


Figure 71: Locations at which EVs are purchased by consumer group

Statistical results on the percentage of consumers who choose places to purchase by segment groups show that the group of consumers who have used EVs accounts for a higher proportion of consumers who choose supermarkets selling EVs and specialized wholesale stores, while the group of potential consumers accounts for a high percentage of people choosing to purchase EVs at showrooms, authorized agents, and then at wholesale stores.

2.4.1.5 References information on electric vehicles

In order for EVs be known and used more widely, it is necessary to mention the means of communication and promotion by which consumers receive information about the product.

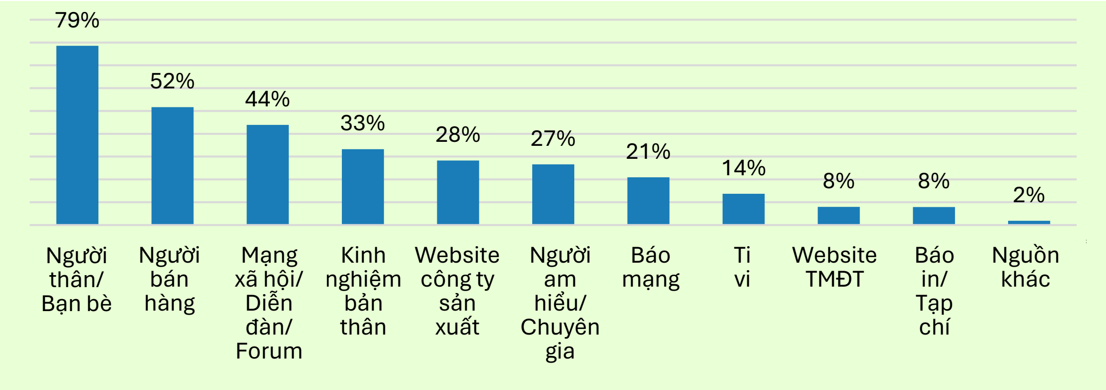


Figure 72: Access to sources of information on EVs

The survey results show that the majority of consumers (79 percent) said that they refer the information about EVs through friends and relatives and they also show confidence in the information received from this information source.

The next source of information that consumers refer to about EVs is through the seller. It can be said that a salesman is not just a salesman at agents/stores, but needs to be considered the distribution of EVs (with specific consumption characteristics) also including sales staff, responsible for consulting, marketing, and conveying the brand images of the business, the benefits and features of the EVs to consumers. Promotion of products directly to consumers through salesmen, or the appearance of EVs at the selling points, are becoming more important to the development strategy of each business.

Online information channels (including social networks, forums, company websites) are also increasingly being approached by consumers. This is the information channel that has the best ability to interact with consumers without being limited by time and space. Although the trend of online information reference has only recently appeared, it will be an increasingly popular information channel and an inevitable trend in the digital period, businesses need to take advantage of this information to promote products, improve competitiveness in the market.

Mass media channels such as television and print newspapers are information channels that are no longer received “excitement” of consumers as in previous years.

It can be said that, when there is a need to use EVs, consumers will often rely on many sources of information to refer the information about EVs, in which sources of information are from relatives/friends, sellers, and other information on cyberspace, etc. is much referenced by consumers. Businesses need to take advantage of all communication tools to convey messages and images to consumers, especially consumer information sources that are easy to access and refer to and highly interactive.

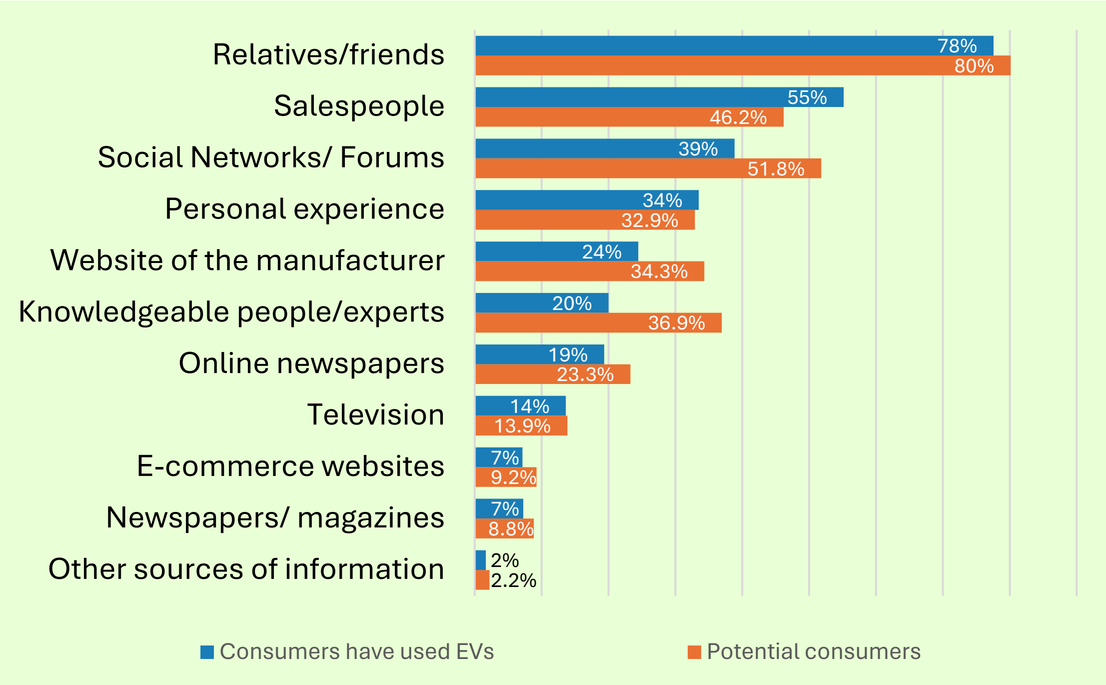


Figure 73: Access to sources of information on EVs by consumer group

The results of the analysis by consumer segment show that the group of potential consumers obtain information from most sources, while the group of consumers access most information through salespeople.

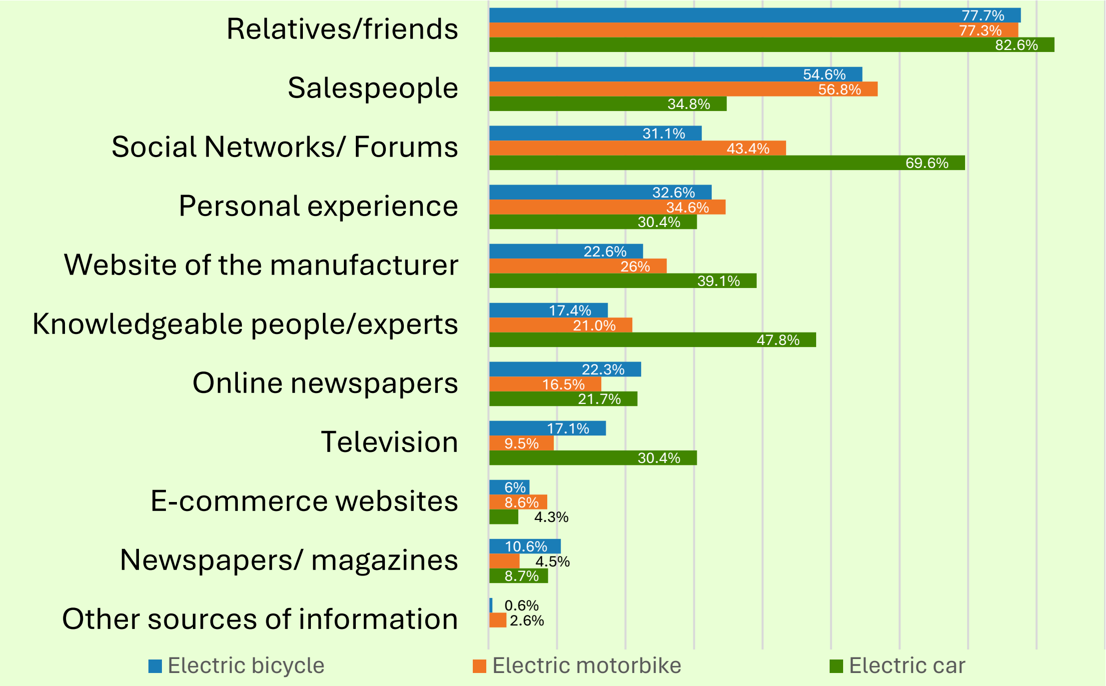


Figure 74: Access to sources of information on EVs by EV type

The chart above shows a significant difference in the proportion of consumers who use various types of EVs when referring to different information sources. Specifically, consumers who use electric cars has the highest proportion of information reference across most sources, followed by consumers who use electric motorcycles, and lastly, consumers who use electric bicycles. This indicates that as the value of EVs that users purchase increases, the level of information reference also increases and is sourced from a wider range of information sources.

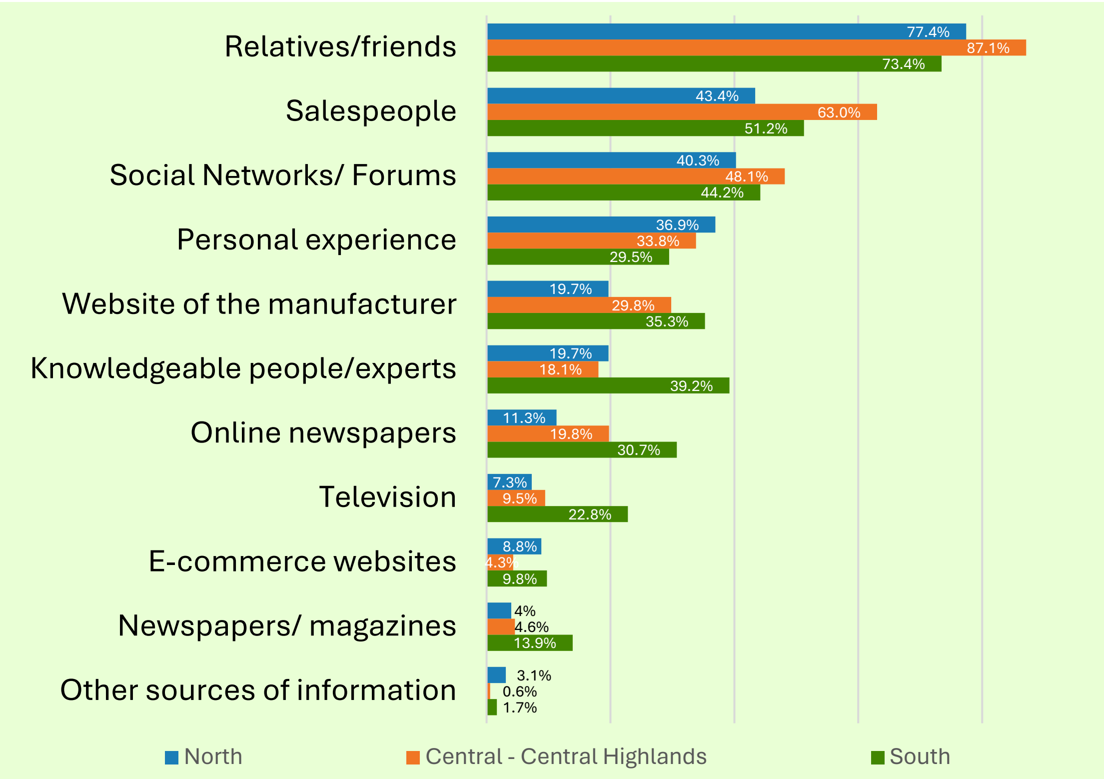


Figure 75: Access to sources of information on EVs by region

When consumers have a need to purchase electric vehicles, there are also differences in accessing information sources depending on the geographical area:

- Consumers in the North are more based on personal experience than consumers in the Central – Central Highlands region and the South.
- Consumers in the Central – Central Highlands region have a higher rate of referencing information through relatives, friends, salesmen and social networks than consumers in the North and the South.
- Consumers in the South refer to official information sources more than consumers in the Central – Central Highlands region and the North such

as experts, knowledgeable people, company websites and through mass media.

2.4.2 Electric vehicle battery disposal habits

It is important to develop an effective management strategy for waste batteries from EVs in order to recover precious metals and reduce negative environmental impacts. The management of waste batteries is usually done in the following order of priority: reduction is the number one priority, followed by reuse, recycling, treatment and disposal. This is a tiered approach used by policymakers to sustainably manage a wide range of solid waste (International Energy Agency, 2020).

In Viet Nam, waste batteries are managed as hazardous waste according to Decision No. 38/2015/ND-CP dated 24 April 2015 on waste and scrap management and Circular No. 36/2015/TT -BTNMT dated 30 June 2015 on hazardous waste management. In addition, the recall and treatment of discarded products is also required to comply with Decision 16/2015/QD-TTg dated 22 May 2015 and Circular No. 34/2017/TT-BTNMT dated 4 October 2017 on the policy of recall and treatment of waste products.

A survey on the waste disposal habits of consumers was conducted.

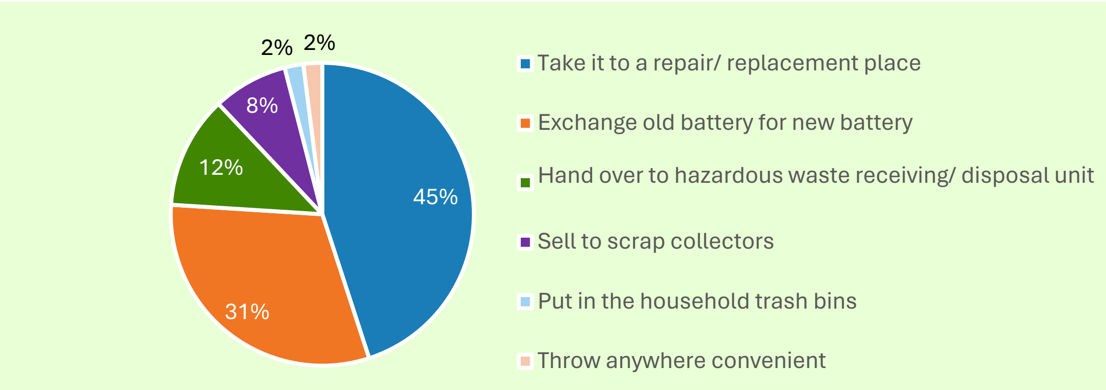


Figure 76: EV battery disposal habits

The survey results show that the majority of consumers have the habit of leaving waste batteries at the place for repair and replacement (45 percent), followed by exchanging the old battery for a new one (31 percent), or handing it over to the receiving unit for handling hazardous waste (12 percent). Less frequently, waste batteries are sold to scrap collectors (eight percent) and four percent of consumers throw waste batteries in convenient places or put them in the household garbage bins. This is problematic because if batteries are not recycled properly, they will leak dangerous chemicals into the environment.

Only 43 percent of those surveyed dispose of EV batteries by giving them to a hazardous waste disposal unit because of the harm that EV batteries have on the environment. 31 percent of consumers showed positive behaviour by exchanging old batteries for new ones. The battery exchange unit can either directly carry out the recycling or hand batteries over to recyclers. The number of surveyed people who do not pay much attention to the environmental harm of EV batteries when leaving them at repair or replacement places, or selling them to scrap collectors, is 45 percent and eight percent respectively (these people are not keeping in mind the destination for discarded battery). Some consumers (four percent) show less concern for the environment and are less active about disposing of EV batteries, which is reflected in the behaviour of putting them in household trash bins or throwing them in any convenient place.

To positively influence battery disposal behaviour, state management and businesses need to emphasize the harmful effects of EV batteries when discharged into the environment without being collected, processed or recycled. Building and expanding a network to carry out collection and treatment or recycling activities such as the programme of collecting - exchanging old batteries for new batteries at preferential prices, battery rental, etc. should be prioritized.

2.5 CONCLUSION AND RECOMMENDATIONS

2.5.1 Conclusion

Market surveys illuminated EV adoption levels, finding one-third of Vietnamese households own multiple vehicles while ICE dominance persists. Specifically, motorbikes are still the main means of transport owned by most households (98% ownership rate). Among households utilizing different EVs, electric motorbikes ranked highest at 34%, followed by electric bicycles at 31%. Electric cars accounted for a mere 2%.

Two-wheeled EVs like e-motorbikes and bicycles have proven more widely embraced and utilized in Vietnam than four-wheeled alternatives, with some domestic productions emerging. While overall numbers remain modest, growing EV ownership over recent years offers encouragement that transitions are incrementally gaining momentum.

The survey found most Vietnamese consumers (79%) had utilized diverse EVs in the past three years, though overall adoption remained modest over that timeframe. Electric cars in particular emerged as a nascent option that 87% of users only began embracing about a year prior. Just 4% had experience with them 2 – 3 years ago. In contrast, electric bicycles and motorbikes represented categories consumers engaged with earliest, though penetration remained minimal even five years back (14% and 6% usage rates respectively at that point).

EVs are used frequently by consumers for the purposes of daily travel, followed by shopping, visiting relatives/friends or going to work and school. Rarely are they used as a means of travel, sightseeing or going to festivals.

Of the 1,427 respondents, approximately 10% foresaw no future EV need. Excluding current users, potential users comprised 78% who anticipated requirements. In terms of market demand for each type of EV, it is expected that:

- Up to 57% of potential consumers may need to purchase electric motorbikes.
- As many as 38% foresee requiring electric cars.
- Electric bicycle demand is anticipated to see minimal gains at around 7%.

The survey explored current EV users' future usage trends. Slightly over a quarter said they'd increase electric bicycle/motorbike frequency. Well over 60% anticipated expanding electric car utilization citing positive assessments of safety, green merits and especially cost savings. Responses from potential consumers likewise signalled imminent transition beginnings.

The majority said plans involved electric bicycle (81%) or motorbike (62%) buys within coming years, reflecting their relatively accessible profiles. For more sizable electric car investments, 32% aimed for purchases in the near term while 30% looked to the next five years, underscoring the diversified yet developing openness across segments.

The majority of consumers deemed electric bicycle prices of 10-20 million VND (56%) as reasonable. For electric motorbikes, most cited 10-40 million VND (88%) as acceptable. Electric car prices garnering plurality support ranged 550-850 million VND (48%). However, some consumers proposed higher or lower costs. Therefore, manufacturers should balance meeting majority price needs while diversifying designs, models and EV features to appeal across segments. This multi-pronged strategy enables manufacturers to leverage niche competitive advantages maximizing inclusive market development efforts.

Additionally, the survey uncovered consumers generally willing to pay premiums of:

- 3.4 million VND for electric bicycles
- 5.1 million VND for electric motorbikes
- 76.5 million VND for electric cars

The survey gauged predictions for EV prevalence, finding 72% believed they would become most commonly used for road transport within 10 years. Nearly one third of those surveyed believe that EVs will be the most commonly used among all types of vehicles in the next five years.

On a 5-point scale, evaluations of EV benefits yielded the following key takeaways:

- Environmental friendliness topped ratings at 4.1 points, underscoring this competitive differentiator.
- Second was economic practicality through lower operating costs (3.8 points).

While these green and financial merits excited consumers, build quality, designs/features as well as supply/support service ecosystems have yet to fully meet expectations - signalling areas requiring continued progress.

Purchasing point preferences varied by vehicle type. For electric bicycles and motorbikes, consumers mainly opted for showrooms, authorized dealers or specialty stores. Electric car buyers unanimously selected direct transactions from manufacturers/authorized distributors.

When sourcing EV information, consumers drew from multiple avenues including relatives/friends, sales representatives, and internet research.

The survey found a lot of consumers tend to leave batteries at repair/replacement facilities (45%). The next most prevalent approach involved exchanging old batteries for new ones (31%), followed by handing them over to hazardous waste treatment (12%). Selling to scrap collectors accounted for 8%, while 4% disposed of them in convenient places or household garbage.

From the above summary survey results, some conclusions can be drawn, as follows:

Growing Electric Vehicle Acceptance in Vietnam: Insights on Demand and EV development

Consumers have begun adopting a wider variety of EVs in terms of both vehicle types and usage frequency. This trend correlates with increasingly positive consumer awareness of EV benefits, including environmental protection, cost and fuel savings, and safety compared to internal combustion engine vehicles. Additionally, most consumers report feeling secure when traveling via EVs or believing them to be produced by reputable, trusted companies.

Currently, market prices for EVs prove quite suitable and acceptable to the majority of consumers. Specifically, the acceptable price range for electric bicycles falls between 10-20 million VND according to 56% of consumers. For electric motorbikes, the range spans 10-40 million VND as cited by 88% of consumers. Meanwhile, electric car prices between 550-850 million VND garner plurality support at 48%. Moreover, some consumers indicate a willingness to pay premiums for EVs. On average, the additional amount consumers are prepared to pay totals 3.4 million VND for electric bicycles, 5.1 million VND for electric motorbikes, and 76.5 million VND for electric cars.

Consumer trust and confidence in EVs form an important foundation that opens favorable opportunities for implementing communication programs and promotional activities to encourage EV adoption.

Moreover, the government's policies on green energy transformation and greenhouse gas emission reductions, such as the recent Decision No. 876/QD-TTG, are poised to establish conditions conducive to comprehensively developing green energy. This includes initiatives from production and assembly to import/supply, as well as investment in transport and technical infrastructure for EVs. A specific roadmap and synchronized nationwide implementation will facilitate these efforts.

Growing Electric Vehicle Market Potential

The EV market in Vietnam shows great promise for growth. This perspective is validated by a consumer survey exploring needs and trends related to EV usage. The findings revealed that as many as 78% of respondents without prior EV experience indicated plans to adopt electric options in the near future. Specifically, the survey examined anticipated demand for various EV types. The majority of potential respondents indicated plans to purchase electric bicycles (81%) or motorbikes (62%) within the next few years.

For more costly electric cars, 32% foresaw buys in the near term, alongside 30% aiming for the subsequent five years. Current EV users also envision increasing usage frequency. Close to 60% - especially 25% for electric bicycles and motorbikes - expected expansion. The survey further found rising utilization of electric cars in the coming period, associated with positive assessments of EVs as safe, environmentally-friendly options yielding cost savings. Consumers' recognition of these benefits is poised to boost their preference to opt for electric choices.

Overcoming the Technological, Infrastructural and Policy Barriers to Electric Vehicle Uptake in Vietnam

While EVs have seen notable enhancements in quality, durability, and design in recent years according to consumer evaluations, some limitations remain.

The issues most frequently cited by consumers relate to batteries and motors being susceptible to water damage, along with limited travel ranges per charge, travel speeds, charging durations, and battery lifespans.

In addition to inherent EV constraints, external barriers inhibiting development include entrenched ICE vehicle usage habits among Vietnamese as well as inadequate technical infrastructure like charging stations, battery exchange sites, and maintenance support.

Other barriers involve high maintenance and repair expenses, challenges procuring replacement parts, and lack of EV information—factors that collectively curb expansionary momentum.

Generally, current EV prices align fairly well with consumer expectations. However, their cost competitiveness still lags ICE vehicles in terms of functionality and features provided.

While state policies have instituted macro-level foundations, there remains a need for complementary micro-level incentives like direct price subsidies, preferential loans, tax exemptions/reductions, along with procurement and operating fee assistance. Such measures could help stimulate greater EV preference over ICE vehicles.

In addition to developmental advantages, EVs also contain certain limitations and objective barriers. Hence, a synchronized effort between governmental administration, manufacturers, and suppliers is necessary to promote increased EV utilization. Initiatives should focus on enhancing awareness, shifting consumption habits, and implementing incentives that encourage choosing EVs over internal combustion options.

2.5.2 Recommendations

2.5.2.1 For manufacturers and supply units of electric vehicles

Production activities: manufacturers should pursue strategies not only of improving EV design and features, but also of applying technology to mitigate inherent disadvantages. Specifically, focused efforts are needed to enhance battery lifespan, reduce charging times, increase electricity storage per charge, and raise travel speeds.

Communication and promotion activities: manufacturers should focus on implementing programs that highlight EVs' outstanding advantages relative to ICE vehicles—such as their quieter operation, emissions reductions, and potential cost savings. Simultaneously, manufacturers should organize experiential events and activities giving consumers first-hand access to EVs, including test drives, temporary use at residential complexes and tourist sites. Such hands-on opportunities allow for information gathering about EV functionality.

Other suggested tactics encompass independent and joint events like expos and fairs to showcase EVs. Distribution of promotional literature detailing the benefits of electric options represents another viable strategy. Consistent engagement through multiple channels helps cultivate understanding and enthusiasm.

Distribution activities: businesses should focus on expanding direct consumer touchpoints like showrooms and authorized dealers while also investing in a dedicated sales team. This team can target high-potential groups such as schools, offices and residential areas through promotional, marketing and consultative services.

Customer care activities: attention should be paid to implementing supportive programs. This includes promotional discounts, price subsidies, installment assistance as well as after-sales maintenance services. Enterprises can fully adopt a proactive operating method centered around providing these services. The aim is to encourage and promote increased EV choice among consumers while building their trust over time.

2.5.2.2 For state management

A major barrier hindering EV adoption is the lack of technical infrastructure like charging station networks. Overcoming this necessitates proactive government policy supporting construction investments.

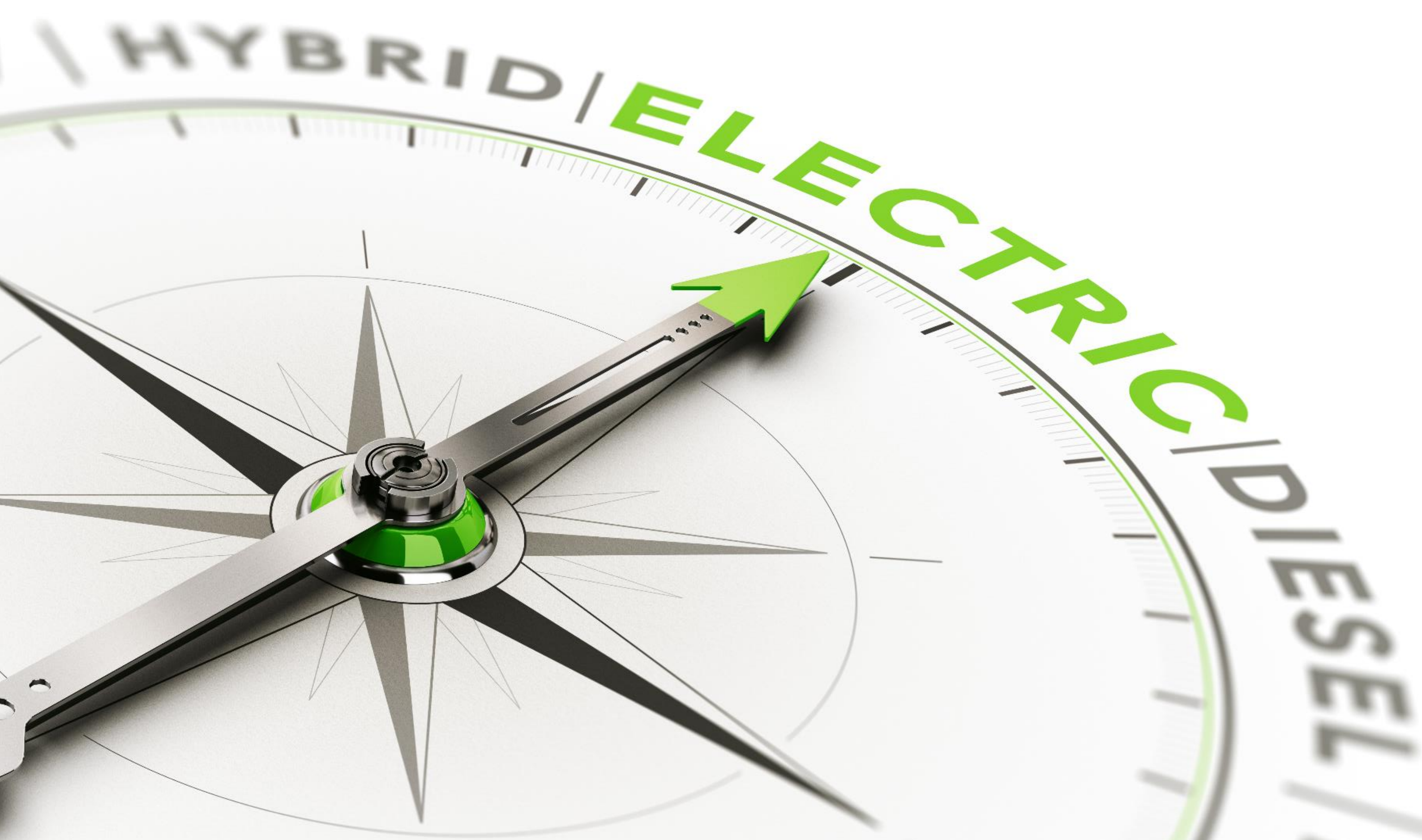
The Ministry of Transport and People's Committees should preside over incorporating funds from investors, enterprises and financial institutions to jointly develop transportation facilities, especially the technical infrastructure required to promote EVs.

Micro-policies directly assisting consumer purchases are also vital. Subsidizing trades of ICE vehicles for affordable EVs implemented through budgets or preferential interest rate loan programs can stimulate demand. Exempting taxes and fees for EV purchases and operation encourages adoption.

The Ministry of Science and Technology should facilitate technological advancement through R&D incentives that enable manufacturers to strengthen production capabilities.

Promulgating guidance enabling media organizations to undertake awareness campaigns highlighting energy savings and reduced emissions can boost understanding of EVs' benefits to society and the environment.

Coordinated multi-faceted strategies are essential to creating an ecosystem conducive for EV proliferation by addressing barriers at both systemic and individual levels.



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ANNEX

ANNEX 1 IMPLEMENTATION PLAN

Personnel For Implementation

Project manager;

Leader;

Scientific secretary;

Specialist - Area 1 direct survey manager;

Specialist - Area 2 direct survey manager;

Specialist - Area 3 direct survey manager;

Specialist - Online survey manager;

Staff – Finance-logistics secretary;

140 collaborators conduct management, supervision & direct interviews at the survey areas and manage, review and verify the survey questionnaires.

Implementation Progress Plan Of The Project

NO.	Tasks	In charge	Support	No. of personnel	Duration
A	SURVEY DESIGN				
1	Proposed plan	Leader	Logistic Secretary		Finished
2	Distribution of samples by location	Leader	Logistic Secretary		Finished

NO.	Tasks	In charge	Support	No. of personnel	Duration
3	Design Questionnaire	Leader	Logistic Secretary		Finished
4	Comment on the plan, sample plan, content of the survey questionnaire	Partner	Independent specialist		Finished
5	Complete the plan, survey plan & content of the questionnaire	Leader	Logistic Secretary		Finished
B	**PREPARATION**				
6	Prepare Stationery		Logistic Secretary		14-31/07/2022
7	Preparing investigation personnel: Area management personnel for fieldwork	Leader	Logistic Secretary		14-31/07/2022
8	Preparation of data import management personnel: recruitment, training, trial work	Leader			14-31/07/2022
9	Prepare gift for respondents	Financial, logistics Secretary	Regional survey manager		14-31/07/2022
C	**SURVEY CONDUCTION**				

NO.	Tasks	In charge	Support	No. of personnel	Duration
10	Area I: Hà Nội, Hải Phòng, Quảng Ninh	Specialist 1		10	01/08 - 10/09/2022
11	Area II: Thừa Thiên Huế, Đà Nẵng, Phú Yên	Specialist 2		11	01-31/08/2022
12	Area III: Hồ Chí Minh City, Cần Thơ	Specialist 3		12	01/08 - 10/09/2022
13	Re-Supervision of Local Collections	Leader	Science Secretary	13	07/08 - 14/09/2022
14	Manage - Supervision of Online Survey	Specialist 4		14	01 - 31/08/2022
D	**DATA IMPORT, CODE**				
15	Import mould design	Science Secretary	Leader		01/08 - 10/09/2022
16	Check, manage, add code	Science Secretary	Leader		07/08 - 14/09/2022
17	Data import management	Science Secretary	Leader		15 - 25/09/2022
18	Import	Science Secretary	Leader	20	15 - 25/09/2022
19	Data cleaning	Science Secretary	Leader		25/09 - 02/10/2022
E	**DATA RUNNING, ANALYSING AND REPORTING WORKS**				
20	Process data, run analysis results (Data Report)	Leader	Science Secretary		02-09/10/2022

NO.	Tasks	In charge	Support	No. of personnel	Duration
21	Draft report	Leader	Science Secretary		10-24/10/2022
22	Adjustment of the report (after receiving feedback from Experts & UNDP)	Leader	Science Secretary		24-31/10/2022
23	Official report	Leader	Science Secretary		01-06/11/2022

ANNEX 2 SURVEY QUESTIONNAIRE

SURVEY OF

DEMAND – EXPECTATIONS AND TRENDS OF USING EVs

To Whom It May Concern!

Currently, the Viet Nam Business Administration Association and the United Nations Development Programme (UNDP) with the support of the Japanese Government, are implementing the project "promoting the choice of using EVs in Viet Nam". The project is implemented with the aim of reducing fuel usages, greenhouse gas emissions and harms to the environment.

In order to have a basis for proposing appropriate solutions to promote the choice of using electric vehicles (EVs), the project carried out a survey to record **"DEMAND - EXPECTATIONS AND TRENDS OF USING EVs "** from direct users.

Your opinion will help us:

- Identify the limitations of different types of EVs to propose solutions to improve.
- Propose policy recommendations to support manufacturers and support people to access and use the EVs.
- Propose communication and marketing activities to help people understand more about the benefits of EVs, thereby promoting the choices and use of Evs.
- Suggest for EVs suppliers to improve and enhance the quality of electronic media, advertising, marketing, supply services, warranty, etc, to better serve the consumers.

Please let us know your opinion by answering the questions in the survey below. We promise that all information you provide will be kept strictly confidential.

Your cooperation helps us to successfully implement the project.

Sincerely thank you!

A. SCREENING RESPONDENTS (INTERVIEWEE)

A1. Which of the following vehicles does your family own? *(can choose more than one answer)*

A2. What types of vehicles are you personally using? *(can choose more than one answer)*

NO.	VEHICLES	A1 Tick the vehicles that the family owns	A2 Tick the personal vehicles the respondent is using	NOTE FOR FORWARDING THE QUESTIONS
1	Bicycle	☐	☐	**Continue to A3** (if respondent is only using & prefers No. 1 - 3)
2	Fuel-powered motorbikes	☐	☐	
3	Fuel-powered cars	☐	☐	
4	Electric bicycle	☐	☐	**Continue to B1** (if respondent is only using & prefers No. 4 - 6)
5	Electric motorbike	☐	☐	
6	Electric car	☐	☐	

A3. Do you know any EVs?

1. ☐ Yes **(Continue to A4)**   2. ☐ No **(Stop the interview)**

A4. Which following [EVs] do you know?

1. ☐ Electric bicycle   2. ☐ Electric motorbike   3. ☐ Electric car

A5. Out of the types of [EVs] that you know of, which one do you like or would like to use? *(tick the appropriate answer)*

NO.	VEHICLES	A5 *Tick the vehicles that respondents* ***want to use***	NOTE FOR FORWARDING THE QUESTIONS
1	Electric bicycle	☐	**Continue to A6** *(if respondent likes one of the following EVs)*
2	Electric motorbikes	☐	
3	Electric car	☐	
4	Do not want to use vehicles	☐	**Ask A7 again, then stop the interview**

A6. How long will it take you to purchase [EVs]]? *(tick the appropriate answer)*

NO.	VEHICLES	Under 1 year	1-2 years	2-3 years	3-5 years	Above 5 years	
1	Electric bicycle	☐	☐	☐	☐	☐	**Continue to B5**
2	Electric motorbike	☐	☐	☐	☐	☐	
3	Electric car	☐	☐	☐	☐	☐	

A7. What concerns make you not want to use EVs? *(can choose many answers)*

1. ☐ Not sure about the quality of EVs
2. ☐ Concerns about the safety of EVs
3. ☐ Concerns about limitations related to the tonnage, speed, and travel distance of EVs
4. ☐ Concerns about the cost of purchasing and operating EVs that is more expensive than a fuel-powered vehicle

5. ☐ Concerns about lack of infrastructure and utility services (battery charging station / maintenance station / repair…)
6. ☐ Due to the unsatisfactory economic conditions for the change of using EVs
7. ☐ Due to being used to existing vehicles (fuel-powered ICE vehicles)
8. ☐ Do not like the EVs
9. ☐ Other concerns (specify):

B. MAIN QUESTIONS

B1. How long ago did you start using [EVs]? *(tick the answer suitable for each type of EV that you have used)*

NO.	ELECTRIC VEHICLES	START USING TIME				
		1 Under 1 year	2 1-2 years	3 2-3 years	4 3-5 years	5 Above 5 years
1	Electric bicycle	☐	☐	☐	☐	☐
2	Electric motorbike	☐	☐	☐	☐	☐
3	Electric car	☐	☐	☐	☐	☐

B2. For what purpose do you usually use [EVs]? *(tick 1 out of 5 frequencies for each purpose)*

NO.	PURPOSE OF USING EVs	FREQUENCY				
		Never	Rarely	Sometimes	Often	Always
1	Go to school	1	2	3	4	5
2	Go to work	1	2	3	4	5
3	Go shopping (market/supermarket/...)	1	2	3	4	5
4	Visiting relatives/friends	1	2	3	4	5
5	Daily travel	1	2	3	4	5
6	Go out / visit / travel / festivals	1	2	3	4	5

7	Other purposes (specify);	1	2	3	4	5

B3. In the next few years, will you change the frequency of using the [EVs] you are using now? *(tick the answer suitable for each type of EVs in use)*

B4. Why do you change the frequency of using EVs? *(specify)*

NO.	ELECTRIC VEHICLES	B3			B4
		1	2	3	Reason for change in frequency of use *(specify)*
		Unchanged	Reduce frequency	Increase frequency	
1	Electric bicycle	☐	☐	☐	
2	Electric motorbike	☐	☐	☐	
3	Electric car	☐	☐	☐	

B5. What makes you like to use [EVs]? *(can choose more than one answer)*

1. ☐ Safety
2. ☐ Easy to use/convenience
3. ☐ Fashionable
4. ☐ Cost saving
5. ☐ Fuel saving
6. ☐ Energy saving
7. ☐ Minimizing environmental harm
8. ☐ Experience new vehicles
9. ☐ Other comments (specify):

B6. In your opinion, what are the benefits of the [EVs] for the environment]? *(can choose more than one answer)*

1. ☐ No emissions (CO_2)
2. ☐ Noise reduction

3. ☐ Reducing smog

4. ☐ Contributing to improving air quality

5. ☐ Saving fuel to ensure sustainable development

6. ☐ Contributing to energy security

7. ☐ Other comments (specify):

B7. In your opinion, to what extent are the following factors important when choosing a [EVs]? *(tick 1 out of 5 importance levels for each factor)*

NO.	FACTORS	Not important at all	Not important	Not really important	Important	Very important
1	Reliability	1	2	3	4	5
2	Safe to use	1	2	3	4	5
3	Utilities/features of EV	1	2	3	4	5
4	Stylish design/colour	1	2	3	4	5
5	Trademarks/ brands	1	2	3	4	5
6	Origin	1	2	3	4	5
7	Price	1	2	3	4	5
8	Operation/ maintenance expenses	1	2	3	4	5
9	The level of power consumption per unit of distance travelled	1	2	3	4	5
10	Travel speed (cubic cent)	1	2	3	4	5

11	The distance travelled after the charging	1	2	3	4	5
12	Fast battery-charging time	1	2	3	4	5
13	Battery life/technology (type)	1	2	3	4	5
14	Supply service (sale)	1	2	3	4	5
15	Warranty service/ maintenance/ repair	1	2	3	4	5
16	Promotion/ discount program	1	2	3	4	5
17	Infrastructure for power transmission (charging station/battery swap)	1	2	3	4	5
18	Reduce environmental pollution	1	2	3	4	5
19	Stimulus package/ incentive	1	2	3	4	5
20	Other factors (specify):	1	2	3	4	5

B8. What is the price range (want to purchase/have purchased) [EVs]? *(tick the appropriate answer)*

NO.	ELECTRIC VEHICLES	1	2	3	4	5	6
		Under 10 mil	10-20 mil	20-30 mil	30-40 mil	40-50 mil	Above 50 mil
1	Electric bicycle	☐	☐	☐	☐	☐	☐
2	Electric motorbike	☐	☐	☐	☐	☐	☐
3	Electric car	Under 400 mil	400 – 550 mil	550-700 mil	700 - 850 mil	850 mil – 1 bil	Above 1 bil
		☐	☐	☐	☐	☐	☐

B9. How much money are you (willing/have) to pay for an ICE vehicle? *(can choose more than one answer)*

NO.	ELECTRIC VEHICLES	Specify the extra amount (Unit: million VND)
1	Electric bicycle	
2	Electric motorbike	
3	Electric car	

B10. When purchasing [Evs], which source [did/will] you look for infromation on [EVs]? *(can choose more than one answer)*

1	Personal experience	☐
2	Relatives/friends	☐
3	Salespeople	☐

4	Knowledgeable people/experts	☐
5	Television	☐
6	Newspapers/magazines	☐
7	Online newspapers	☐
8	Social Networks/ Forums	☐
9	Website of the manufacturer	☐
10	E-commerce websites	☐
11	Other sources of information	☐

B11 Where do you (will/were) choose to purchase EVs? *(can choose more than one answer)*

1	2	3	4	5	6
EVs Super-markets	Specialized wholesale stores	Specialized retail stores	Showroom of the manufacturer/ authorized agents	Repair shops	Other places
☐	☐	☐	☐	☐	☐

B12. Do you agree with the following comments about [EVs]? *(tick 1 out of 5 agreement level for each comment)*

NO.	COMMENTS	Not agree at all	Disagree	Neutral	Agree	Totally agree
1	I think the EVs is better than an ICE	1	2	3	4	5
2	I believe that EV is safer than an ICE	1	2	3	4	5
3	I think that EV more convenient to use than an ICE vehicle	1	2	3	4	5
4	I think that EV often has a beautiful model, trendy design	1	2	3	4	5
5	I think that the EVs require less maintenance/repairs than the ICE vehicles	1	2	3	4	5
6	In general, EVs have many outstanding features compared to ICE vehicles	1	2	3	4	5
7	EV has a travel speed (cc) meets my expectations	1	2	3	4	5
8	The distance travelled after charging meets my expectations	1	2	3	4	5
9	EVs are being widely supplied/easily purchased when there is a need	1	2	3	4	5
10	I think using EV is more cost-effective than an ICE vehicle	1	2	3	4	5

11	I think that the EV is cheaper than the ICE of the same type	1	2	3	4	5
12	I believe that EV is manufactured by companies with reputable brands	1	2	3	4	5
13	The production units of EV have a reliable after-sales (warranty) system	1	2	3	4	5
14	I know the preferential policies to encourage the use of EV	1	2	3	4	5
15	I think that using EV reduces greenhouse emissions, noise	1	2	3	4	5
16	I think that using EV contributes to saving fuel and energy	1	2	3	4	5
17	I think that the EV in general has a reliable function of protecting the environment	1	2	3	4	5
18	I think that EV is being used by more people	1	2	3	4	5
19	I feel secure when using the EV to travel	1	2	3	4	5
20	I feel confident (pride) when I use EV to travel	1	2	3	4	5
21	When I have the opportunity (exchange /	1	2	3	4	5

	purchase new vehicle) I will purchase EV					
22	I'm willing to pay extra to use EV	1	2	3	4	5
23	I recommend others to use EV	1	2	3	4	5
24	Most likely I will purchase a EV in the near future	1	2	3	4	5

B13. In your opinion, after about how many years will [EVs] account for the highest percentage of means of transport? *(tick the best answer)*

1. ☐ About 5 years 2. ☐ About 10 years 3. ☐ About 15 years

4. ☐ About 20 years 5. ☐ About 25 years 6. ☐ About 30 years

7. ☐ Other comments (specify):

B14. What limitations do [EVs] have in your opinion? *(can choose more than one answer)*

1. ☐ The battery and motor are easy to damage when submerged

2. ☐ Limit the distance travelled after each charge

3. ☐ Limited travel speed

4. ☐ Long battery-charging time

5. ☐ Poor battery life due to outdated technology

6. ☐ Difficult to purchase spare parts/components

7. ☐ Other comments (specify):

B15. In your opinion, apart from the limitations mentioned above, what are the barriers that [EVs] have not been widely used yet? *(tick 1 out of 5 levels of love for each comment)*

NO.	COMMENTS	Not agree at all	Disagree	Neutral	Agree	Totally agree
1	Because consumers are not aware of the benefits of EVs to the environment	1	2	3	4	5
2	Because consumers are not sure about the safety of EVs	1	2	3	4	5
3	Because consumers are used to using internal engine cars	1	2	3	4	5
4	Because it is not as convenient as using an ICE	1	2	3	4	5
5	Due to the lack of policies to prioritize and encourage the use of EV	1	2	3	4	5
6	Because support/incentive policies have not created motivation to promote consumers	1	2	3	4	5
7	Due to consumers' lack of information about EV	1	2	3	4	5
8	Due to lack of utility services (maintenance/repair...)	1	2	3	4	5

9	Due to lack of technical infrastructure (charging station/ battery swap)	1	2	3	4	5
10	Due to the high cost	1	2	3	4	5
11	Due to high cost of maintenance/repair/batteries swap	1	2	3	4	5
12	Due to the concern that the EV battery causes environmental pollution	1	2	3	4	5
13	Other barriers (specify):	1	2	3	4	5

B16. For damaged or expired batteries of [EVs], how do you (will/have) dispose of them? (*Choose 1 best answer)*

1. ☐ Throw it anywhere convenient

2. ☐ Put it in the household trash bins

3. ☐ Buried underground

4. ☐ Sell to scrap collectors

5. ☐ Take it to a repair/replacement place

6. ☐ Exchange the old battery for a new one

7. ☐ Hand over to hazardous waste receiving/disposal unit

8. ☐ Other (specify):

B17.1. In your opinion, in order to promote the use of EVs, what support policies should be implemented? *(can choose more than one answer)*

1. ☐ Have a policy of exchanging ICE vehicles (old) for EVs (new) at a preferential price

2. ☐ Invest in installing charging stations/maintenance stations at preferential or free rates for EVs

3. ☐ Exemption from excise tax/import tax... for EVs and their components

4. ☐ Exemption of circulation fees (tolls/parking fees,) for a certain period of time (5 years - 10 years) for EVs

5. ☐ Support for preferential loans or interest-free instalment loans for purchasers of EVs

6. ☐ Direct subsidy of an amount (5%, 10%, 20%, cost) to the purchaser of the EVs

7. ☐ Invest in electricity development at places of interest/tourism for people to try for free to experience

8. ☐ Have preferential policies (loan, discount, price subsidy,) for car rental service providers to switch to EVs

9. ☐ Carry out communication activities about the benefits of using EVs

10. ☐ Other comments (specify):

B17.2. According to you, what needs to be done to encourage consumers to use EVs? *(can choose more than one answer)*

1. ☐ Implement interest-free instalment purchase program

2. ☐ Make a discount/promotion when purchasing a vehicle

3. ☐ Provide inspection/maintenance/battery charging service with long-term preferential cost (from 10 years or more)

4. ☐ Exchange old batteries for new ones at a discount or free of charge

5. ☐ Other comments (specify):

B18. Do you have any other suggestions to make the EVs more widely accepted and used by everyone?

C. INFORMATION OF RESPONDENTS

Full name of respondents:

C1. Gender:

1. ☐ Male
2. ☐ Female

C2. Age ranges:

1. ☐ From 16 - 18
2. ☐ From 19 – 22
3. ☐ From 22 – 27
4. ☐ From 28 - 36
5. ☐ From 37 - 42
6. ☐ From 43 - 57
7. ☐ From 57 – 65
8. ☐ Above 65

C3. Your educational level:

1. ☐ Elementary school
2. ☐ Secondary school
3. ☐ High school
4. ☐ Studying University/College
5. ☐ University/College graduated
6. ☐ Higher Education

C4. Your occupation:

1. ☐ Student
2. ☐ Office worker
3. ☐ Official/Cadre
4. ☐ Professional (Teacher, Doctor)
5. ☐ Business manager
6. ☐ Business owner
7. ☐ Seller
8. ☐ Freelancer
9. ☐ Homemaker
10. ☐ Retired

C5. Your family's income is about:

1. ☐ Under 10 mil
2. ☐ From 10 - 20 mil
3. ☐ From 20- 30 mil
4. ☐ From 30- 40 mil
5. ☐ From 40- 50 mil
6. ☐ Above 50 mil

C6. Interview location's address: ______________________________

C7. Regions:

1. ☐ Hà Nội
2. ☐ Hải Phòng
3. ☐ Quảng Ninh
4. ☐ Thừa Thiên Huế
5. ☐ Đà Nẵng
6. ☐ Phú Yên
7. ☐ Hồ Chí Minh City
8. ☐ Cần Thơ

C8. Area: 1. ☐ Urban 2. ☐ Rural

C9. Mobile phone: ______________________________

C10. Email: ______________________________

THANK YOU FOR YOUR COOPERATION!

INTERVIEWER: I certify that all the information collected and recorded above is completely true as provided by the respondent

Full name: No.:

CHECKING QUALITY CONTROL DATA IMPORT

ANNEX 3 FACTORS IMPACTING THE LEVEL OF CONSUMER SATISFACTION ON EVs

Within the framework of a survey to evaluate the level of satisfaction of users with EVs, the project board focuses on the following basic factors to exploit consumers' perceptions and evaluations of EV, on that basis to determine the factors that affect the satisfaction of consumers on EVs.

- **Quality, design, and features of EVs:** product quality is defined in many different ways depending on the object of study. Overall, product quality includes characteristics of outstanding features, product specificity, etc. Product quality is the value created to meet the expectations of consumers. Product designs and features are differentiated from those of substitute products.

- **Supply activities & support activities for consumers to access and use EVs:** incentive policies, warranties are said to be attractive to consumers, making consumers interested in and participating in making purchases, these factors create attractiveness for consumers.

- **Economic benefits when using EVs:** the top-of-mind factors that brings economic benefits to consumers is the price. Price is a form of monetary expression of the value of goods, products and services. Prices are determined based on the use value and perception of consumers about the products and services they use. In addition, to evaluate the impact of the price factor on consumer satisfaction, it is necessary to consider more fully aspects such as price compared to competitors or substitute products; price compared to consumers expectations when using the product.

- **Social benefits or environmental protection effects of EVs:** are what differentiate the product, which create an attraction for consumers compared to substitute products.

- **The trust level in the brand and the supplier of EV:** Reputation is a concept that is consistently associated with intangible values in the subconscious minds of consumers. The relationship between the product of the manufacturer and the consumer's association with the brand's attributes through the consumer's own reputation, prestige, and trust in the brand.

Method of testing the factors affecting the satisfaction level of consumers with EVs

Multivariable regression method allows to determine which factors (independent variables) have an impact on the satisfaction of consumers (dependent variables) on EVs.

If the sig value < 5%, the independent variable has an impact on the dependent variable; and vice versa, the value of sig > 5%, the independent variable has no significance or no impact, no influence on the dependent variable.

In this survey, we can put forward the following theories:

- The level of satisfaction of consumers with the EV depends on their evaluation indicators of product quality, design, and features of the EVs.
- Supply services & distribution support activities have an impact on consumers satisfaction with EVs.
- The level of satisfaction of consumers with the EV depends on their evaluation on economic benefits, social benefits, and trust.

In order to consider which factors really impact the satisfaction of consumers with EV, multivariate regression method is used to test the above theories.

Theory check 1

The level of satisfaction of consumers with EV depends on their evaluation indicators about product quality, design, and features of EVs.

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.501	.123		12.159	.000
	I think the EV is more durable than the ICE vehicle	.051	.033	.053	1.553	.121
	I think that EV is safer than an ICE vehicle	.114	.032	.118	3.571	.000
	I think that EV more convenient to use than an ICE vehicle	.075	.028	.080	2.676	.008
	I think that EV usually has a nice model, trendy design	.053	.030	.055	1.771	.077
	I think that EV has less maintenance/repair than the ICE vehicle	.076	.028	.083	2.704	.007
	In general, EV have many outstanding features	.060	.030	.064	1.982	.048

	compared to ICE vehicle					
	EV has a travel speed (cc) that meets my expectations	.100	.033	.097	2.984	.003
	Distance travelled after each charge meets my expectations	.141	.033	.141	4.223	.000

a. Dependent Variable: When I have the opportunity (exchange cars/purchase a new car) I will purchase EVs

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.011	.136		14.760	.000
	I think the EV is more durable than the ICE vehicle	.125	.036	.123	3.457	.001
	I think that EV is safer than an ICE vehicle	.007	.035	.007	.202	.840
	I think that EV more convenient to use than an ICE vehicle	.132	.031	.134	4.268	.000
	I think that EV usually has a	.065	.033	.065	1.994	.046

	nice model, trendy design					
	I think that EV has less maintenance/repair than the ICE vehicle	.059	.031	.061	1.909	.056
	In general, EV have many outstanding features compared to ICE vehicle	.008	.034	.009	.249	.803
	EV has a travel speed (cc) that meets my expectations	.064	.037	.059	1.724	.085
	Distance travelled after each charge meets my expectations	.090	.037	.086	2.441	.015

a. Dependent Variable: Most likely I will purchase a EV in the near future

The results of data analysis by the multivariate regression method to test the theory show that most of the statements about the quality, design, and features of EV have a great impact on the probability that consumers will purchase EV. when changing vehicles, adding or purchasing new one. In particular, the indicators of durability, design, style, convenience features, and distance travelled after each battery charge have an impact on motivating consumers to purchase EV in the near future.

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.301	.136		9.537	.000
	I think the EV is more durable than the ICE vehicle	.133	.036	.126	3.649	.000
	I think that EV is safer than an ICE vehicle	.047	.035	.045	1.345	.179
	I think that EV more convenient to use than an ICE vehicle	.058	.031	.057	1.871	.062
	I think that EV usually has a nice model, trendy design	.039	.033	.037	1.175	.240
	I think that EV has less maintenance/repair than the ICE vehicle	.079	.031	.079	2.539	.011
	In general, EV have many outstanding features compared to ICE vehicle	.108	.034	.106	3.227	.001

	EV has a travel speed (cc) that meets my expectations	.019	.037	.017	.502	.616
	Distance travelled after each charge meets my expectations	.178	.037	.164	4.828	.000
a. Dependent Variable: I am willing to pay extra to use EVs						

The results of theory testing also show that consumers are willing to pay extra to use EV when the durability, quality, and performance of EVs are superior to those of ICE; or the distance travelled after each battery charge meets their expectations.

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.670	.128		13.014	.000
	I think the EV is more durable than the ICE vehicle	.158	.034	.159	4.634	.000
	I think that EV is safer than an ICE vehicle	.030	.033	.030	.904	.366
	I think that EV more convenient to use than an ICE vehicle	.122	.029	.127	4.187	.000

	I think that EV usually has a nice model, trendy design	-.003	.031	-.003	-.107	.915
	I think that EV has less maintenance/repair than the ICE vehicle	.110	.029	.116	3.753	.000
	In general, EV have many outstanding features compared to ICE vehicle	.072	.032	.075	2.268	.023
	EV has a travel speed (cc) that meets my expectations	.107	.035	.102	3.090	.002
	Distance travelled after each charge meets my expectations	.037	.035	.036	1.075	.283

a. Dependent Variable: I recommend others using EVs

The results of theory testing show that most of the factors affecting consumers behaviour will recommend others to use EV, in which 5 factors influencing the behaviour of consumers are (1) durability, (2) convenience, (3) guaranteed quality, low-maintenance, (4) outstanding performance, and (5) adequate speed.

Thus, the results of multivariate regression analysis to test the theory show that the consumers' evaluation indicators of product quality, design, features, etc. have a significant impact on the satisfaction of consumers on EV.

Theory check 2

Supply services & distribution support activities have an impact on consumers satisfaction with EV.

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.141	.126		16.963	.000
	EVs are widely available / easily purchased when there is a need	.145	.028	.144	5.269	.000
	The production units of EVs have a reliable after-sales (warranty) system	.137	.033	.134	4.134	.000
	I know the preferential policies to encourage the use of EV	.189	.030	.202	6.333	.000

a. Dependent Variable: When I have the opportunity (exchange cars/purchase a new car) I will purchase EVs

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.573	.136		18.864	.000
	EVs are widely available / easily purchased when there is a need	.088	.030	.084	2.976	.003
	The production units of EVs have a reliable after-sales (warranty) system	.133	.036	.124	3.708	.000
	I know the preferential policies to encourage the use of EV	.154	.032	.157	4.767	.000

a. Dependent Variable: Most likely I will purchase a EV in the near future

The results of data analysis by the multivariable regression method to test the theory show that all the statements about the supply services and distribution support activities have a great impact on the ability of consumers to purchase EV when changing vehicles, purchasing more or new vehicles. At the same time, it is meaningful to promote consumers to purchase EVs in the near future.

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.949	.140		13.955	.000
	EVs are widely available / easily purchased when there is a need	.191	.030	.174	6.259	.000
	The production units of EVs have a reliable after-sales (warranty) system	.069	.037	.062	1.878	.061
	I know the preferential policies to encourage the use of EV	.187	.033	.184	5.663	.000
a. Dependent Variable: I am willing to pay extra to use EVs						

The results of theory testing also show that consumers are willing to pay extra to use EV when various types of EVs are widely available, and there are preferential policies to encourage their use.

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.077	.129		16.140	.000
	EVs are widely available / easily purchased when there is a need	.117	.028	.114	4.182	.000
	The production units of EVs have a reliable after-sales (warranty) system	.195	.034	.186	5.779	.000
	I know the preferential policies to encourage the use of EV	.177	.030	.184	5.797	.000
a. Dependent Variable: I recommend others using EVs						

The results of theory testing show that all factors have a significant impact on consumers behaviour that will recommend others to use EV.

Thus, the results of multivariate regression analysis to test the theory show that the indicators of consumers' evaluation of services provided and support policies to encourage the use of EV have a significant impact on consumers satisfaction on EV.

Theory check 3

The satisfaction of consumers with EVs depends on their evaluation indicators of economic benefits; social benefit, and the trust level.

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.809	.139		5.820	.000
	I think using EV is more cost-effective than an ICE vehicle	.107	.029	.105	3.722	.000
	I think that the EV is cheaper than the ICE car of the same type	-.016	.025	-.018	-.647	.518
	I think that using EV reduces greenhouse gas emissions and noise	.177	.036	.169	4.917	.000
	I think that using EV helps to save fuel and energy	.023	.041	.022	.570	.569
	I think that in general, EV has a reliable function of	.112	.037	.107	3.041	.002

	protecting the environment					
	I think EV is manufactured by companies with reputable brands	.088	.029	.090	3.002	.003
	I think that EV is being used by more people	.258	.032	.246	8.123	.000
a. Dependent Variable: When I have the opportunity (exchange cars/purchase a new car), I will purchase EVs						

Coefficients[a]						
Model		**Unstandardized Coefficients**		**Standardized Coefficients**	**t**	**Sig.**
		B	**Std. Error**	**Beta**		
1	(Constant)	.721	.145		4.988	.000
	I think using EV is more cost-effective than an ICE vehicle	.047	.030	.044	1.562	.119
	I think that the EV is cheaper than the ICE car of the same type	.012	.026	.013	.483	.629
	I think that using EV reduces greenhouse gas	.321	.037	.293	8.586	.000

	emissions and noise					
	I think that using EV helps to save fuel and energy	-.082	.043	-.075	-1.929	.054
	I think that in general, EV has a reliable function of protecting the environment	.197	.038	.179	5.124	.000
	I think EV is manufactured by companies with reputable brands	.112	.030	.109	3.693	.000
	I think that EV is being used by more people	.185	.033	.168	5.612	.000

a. Dependent Variable: Most likely I will purchase a EV in the near future

The results of data analysis using the multivariate regression method to test the theory show that most of the statements about economic benefits, environmental benefits, and the trust level of consumers have an impact on the probability that consumers will purchase EV when replacing, adding, or buying a new vehicle. In particular, the factors of environmental benefits, reputable brands, or being trusted by many people are important to promote consumers to purchase EVs in the near future.

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.494	.167		8.967	.000
	I think using EV is more cost-effective than an ICE vehicle	-.015	.035	-.014	-.447	.655
	I think that the EV is cheaper than the ICE car of the same type	.033	.030	.034	1.112	.266
	I think that using EV reduces greenhouse gas emissions and noise	-.036	.043	-.031	-.829	.407
	I think that using EV helps to save fuel and energy	-.003	.049	-.003	-.063	.950
	I think that in general, EV has a reliable function of protecting the environment	.081	.044	.071	1.824	.068
	I think EV is manufactured by companies	.215	.035	.202	6.142	.000

	with reputable brands					
	I think that EV is being used by more people	.256	.038	.224	6.722	.000
a. Dependent Variable: I am willing to pay extra to use EVs						

The results of theory testing also show that economic and environmental benefits have no impact on consumers' willingness to pay extra to use EV. However, the trust and confidence of consumers in the manufacturer's brand, and EV that are widely used by many people have a significant impact on the behaviour of consumers who are willing to pay extra to use EV.

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.430	.151		9.495	.000
	I think using EV is more cost-effective than an ICE vehicle	- .053	.031	-.051	-1.695	.090
	I think that the EV is cheaper than the ICE car of the same type	.011	.027	.012	.394	.694
	I think that using EV reduces greenhouse gas	.174	.039	.162	4.465	.000

	emissions and noise					
	I think that using EV helps to save fuel and energy	.005	.045	.004	.105	.917
	I think that in general, EV has a reliable function of protecting the environment	.066	.040	.061	1.646	.100
	I think EV is manufactured by companies with reputable brands	.075	.032	.075	2.373	.018
	I think that EV is being used by more people	.322	.034	.299	9.346	.000

a. Dependent Variable: I recommend others using EVs

The results of theory testing show that there are only 3 factors that have a significant impact on consumers behaviour that will advise others to use EV, whch are using EVs to reduce greenhouse gas emissions, vehicles manufactured by reputable brands and vehicles trusted by many people.

Thus, the results of multivariate regression analysis to test the theory show that the indicators of economic benefits, environmental benefits, and the trust level of consumers have a certain significance on consumers' satisfaction about EV.

From the results of multivariable regression analysis to test the theory as presented above, it can be concluded that all indicators of quality, design, product features, supply service, economic benefits and environmental benefit that the EV itself brings, along with the trust of consumers in the manufacturing unit of EV, etc. have an impact on the satisfaction of consumers, which has the meaning of promoting consumers increase their choice of using EV. In addition to the available strengths such as saving operating costs, or the environmental protection effects of EV, which are recognized by consumers, state management and businesses need to pay more attention to mechanisms and policies to implement controlling the quality of EV, improving the design and features of EV, and providing services, incentives to encourage consumers to choose EV. Besides, it is also necessary to implement programmes to communicate the brand, the benefits of using EV to attract the consumers.