

## Battery Rental Scheme for Increasing the Adoption of Four Wheeled Electric Vehicles: A Conjoint Analysis

### *Skema Sewa Baterai untuk Meningkatkan Penggunaan Kendaraan Listrik Roda Empat: Analisis Conjoint*

Andreas Arga Donovan<sup>\*</sup>, Nila A. Windasari

Master of Business Administration Program, Bandung Institute of Technology, Indonesia

<sup>\*</sup>correspondence e-mail: [andreas\\_donovan@sbm-itb.ac.id](mailto:andreas_donovan@sbm-itb.ac.id)

| Article Info                                                                                                                                                                                                                                                                                                                              | Abstract                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><i>Article History :</i><br/>Received: 20 May 2025<br/>Accepted: 25 July 2025<br/>Published: January 2026</p>                                                                                                                                                                                                                          | <p>The study explores key factors influencing consumer preferences for battery rental schemes and their role in increasing four-wheeled electric vehicle adoption in Indonesia. Using the Theory of Planned Behavior (TPB) and Technology Acceptance Model (TAM), data was gathered via an online survey targeting potential EV buyers in the Jakarta metropolitan area. The goal was to identify the most appealing rental scheme based on consumer priorities like affordability, convenience, and reliability. Findings reveal that rental cost holds the greatest weight (40 percent), followed by battery warranty (30 percent), after-sales service (20 percent), and replacement cost (10 percent). Among tested options, scenario 3 with IDR 800,000 monthly rental, lifetime warranty, free replacement, and full after-sales support was most preferred, capturing 35 percent projected market share.</p> <p><b>Keywords:</b> Adoption Barriers, Battery Rental, Consumer Preferences, Electric Vehicles, Sustainable Mobility.</p> |
| <p><i>DOI Number :</i><br/>10.33059/jseb.v17i1.11700</p> <p><i>How to Cite :</i><br/>Donovan, A. A., &amp; Windasari, N. A. (2026). Battery rental scheme for increasing the adoption of four wheeled electric vehicles: A conjoint analysis. <i>Jurnal Samudra Ekonomi dan Bisnis</i>, 17(1), 69-83. DOI: 10.33059/jseb.v17i1.11700.</p> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

| Info Artikel                                                                                                                                                                                                                                                                                                                                | Abstrak                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><i>Riwayat Artikel :</i><br/>Diterima: 20 Mei 2025<br/>Disetujui: 25 Juli 2025<br/>Dipublikasikan: Januari 2026</p>                                                                                                                                                                                                                      | <p><i>Studi ini meneliti faktor utama yang memengaruhi preferensi konsumen terhadap skema rental baterai dan efektivitasnya dalam meningkatkan adopsi kendaraan listrik roda empat di Indonesia. Menggunakan pendekatan Theory of Planned Behavior (TPB) dan Technology Acceptance Model (TAM), data dikumpulkan melalui survei online terstruktur yang menargetkan calon pembeli kendaraan listrik di wilayah metropolitan Jakarta. Tujuannya adalah mengidentifikasi skema rental paling menarik berdasarkan prioritas konsumen seperti keterjangkauan, kenyamanan, dan keandalan. Hasil menunjukkan bahwa biaya sewa menjadi faktor paling berpengaruh (40 persen), diikuti oleh garansi baterai (30 persen), layanan purna jual (20 persen), dan biaya penggantian baterai (10 persen). Dari beberapa skenario yang diuji, Skenario 3 dengan biaya sewa IDR 800.000 per bulan, garansi seumur hidup, penggantian gratis, dan layanan purna jual lengkap menjadi pilihan utama dengan potensi pangsa pasar 35 persen.</i></p> <p><b>Kata kunci:</b> Hambatan Adopsi, Sewa Baterai, Preferensi Konsumen, Kendaraan Listrik, Mobilitas Berkelanjutan.</p> |
| <p><i>Nomor DOI :</i><br/>10.33059/jseb.v17i1.11700</p> <p><i>Cara Mensitasi :</i><br/>Donovan, A. A., &amp; Windasari, N. A. (2026). Battery rental scheme for increasing the adoption of four wheeled electric vehicles: A conjoint analysis. <i>Jurnal Samudra Ekonomi dan Bisnis</i>, 17(1), 69-83. DOI: 10.33059/jseb.v17i1.11700.</p> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

## INTRODUCTION

Indonesia is committed to achieving net zero emissions by 2060, in line with the global commitment to the Paris Agreement under the Conference of the Parties (COP) (IEA, 2023). This national target is very ambitious and reinforces Indonesia's commitment to addressing climate change and transitioning to sustainable development. One of the largest contributors to emissions in Indonesia is transportation, which still relies on fossil fuels. This sector contributes around 23 percent of Indonesia's total greenhouse gas emissions (WRI, 2023). The rapid increase in vehicle ownership and fuel consumption has further intensified emission levels, particularly in urban areas with high traffic density (IEA, 2023). Without significant intervention, emissions from the transportation sector are expected to continue rising, posing a major challenge to Indonesia's decarbonization efforts. Reducing emissions from the transportation sector has become a critical priority for Indonesia to meet its net zero target and mitigate the long-term impacts of climate change.

The transportation sector remains one of the largest contributors to greenhouse gas emissions in Indonesia, primarily due to its heavy reliance on fossil fuels (IESR, 2022). To effectively reduce emissions and support the country's decarbonization efforts, a transition to cleaner and more sustainable mobility solutions is essential. Electric vehicles (EVs) are the main solution to reduce emissions in the transportation sector (IEA, 2023). This is the focus of the government to prioritize all processes of adopting electric vehicles, which is also in line with the government's vision of a low-carbon economy. By replacing conventional vehicles with EVs, Indonesia aims to reduce emissions, combat climate change, improve urban air quality, and reduce dependence on imported fossil fuels (Ministry of Energy and Mineral Resources, 2023).

Regarding the adoption of electric vehicles, the government does not only look at it from an environmental perspective but also considers industrial and financial dimensions. Indonesia, as the owner of the largest nickel reserves in the world, has a very large opportunity in the electric vehicle ecosystem. It is known that electric vehicle batteries contain at least 73-79 percent nickel content (Widiyandaria *et al.*, 2022). By utilizing these natural resources, the government sees Indonesia as having the potential to become a downstream producer of nickel in the world for the entire global EV industry (BKPM, 2022). The manufacturing process from extraction of raw materials, vehicle assembly, to the sale of electric vehicles will certainly grow the Indonesian economy.

The government has taken steps to create policies to support the electric vehicle industry in the form of local content standards (TKDN), tax incentives, and investment in industrial areas dedicated to electric vehicle manufacturing (BKPM, 2022). The Indonesian government has also set a very large target for electric vehicle adoption, i.e.: 13 million electric vehicles by 2030, including two-wheeled vehicles, four-wheeled vehicles, and electric buses (Ministry of Industry, 2022). To achieve this, the government introduced comprehensive measures including direct subsidies to lower EV purchase costs, relaxed loan schemes for EV buyers, and odd-even traffic regulations that favor EV users (IESR, 2023). Furthermore, investments in public charging infrastructure and battery-swapping stations are being accelerated to improve accessibility and convenience for EV owners.

Despite these extensive efforts, challenges remain, as EV adoption rates are still far below expected levels. Several factors hinder the widespread adoption of EVs in Indonesia. The high initial cost of electric vehicles, especially due to expensive batteries, is a significant barrier for many consumers particularly those in the middle-income bracket who dominate vehicle ownership in Indonesia (Saputra & Andajani, 2023). In addition, the lack of adequate charging infrastructure, especially in suburban and rural areas, raises concerns about the practicality of electric vehicle

ownership. Public skepticism about electric vehicle technology — including concerns about battery life, maintenance costs, resale value, and availability of after-sales service — is further contributing to low consumer confidence (Nair *et al.*, 2024).

Financing options are still seen as limited, as are installment plans specifically designed for electric vehicles, which make conventional vehicles a more attractive option for cost-conscious buyers. Another important issue is the readiness of the supporting industry and infrastructure for electric vehicles. Although the government has made significant investments in battery production, the integration of this industry with downstream vehicle production is still in its early stages (IEA, 2023). Regulatory uncertainty and the absence of uniform EV standards across the region complicate the ecosystem, creating uncertainty for producers and consumers (PwC Indonesia, 2023). Indonesia's energy mix, where electricity generation still relies heavily on coal, also raises questions about the actual environmental impact of electric vehicles if the energy used for charging comes from non-renewable sources. This highlights the need for electricity sources that come from renewable energy, so as to maximize benefits and produce a clean environment (IEEFA, 2022).

The adoption of electric vehicles in Indonesia is not only a matter of meeting the net zero emission target for the environment, but also a broader systemic transformation challenge (Hakam & Jumayla, 2024). Achieving the government's ambitious target by 2030 will require a multifaceted approach that addresses economic, infrastructure, social, and regulatory barriers. The success of this transition depends not only on government initiatives but also on collaboration between the private sector, financial institutions, and consumers to create a supportive ecosystem (IESR, 2024). This study offers a novel contribution by proposing a battery leasing scheme as a breakthrough solution to address the high initial cost of electric vehicles, one of the most significant barriers to adoption. By shifting battery ownership to a monthly leasing model, consumers can access electric vehicles at a more affordable price while enjoying a lifetime performance warranty and reducing the risks associated with battery degradation. Using Choice-Based Conjoint (CBC) analysis, this study systematically captures consumer preferences to identify the most profitable leasing scheme configuration, providing insights for stakeholders seeking to accelerate electric vehicle adoption in Indonesia.

## LITERATURE REVIEW

The academic literature has emphasized that various interrelated factors influence electric vehicle adoption, including economic considerations, infrastructure availability, behavioral intentions, and technological trust. This thesis focuses on identifying barriers to electric vehicle (EV) adoption in Indonesia, particularly through battery rental schemes and the concept of Total Cost of Ownership (TCO) as critical factors influencing consumer decisions (Ouyang *et al.*, 2021). The research aims to understand how a battery rental model can reduce upfront costs, improve affordability, and enhance overall adoption rates of four-wheeled EVs.

According to the Deloitte 2024 Global Automotive Consumer Study, consumers in various countries, including Indonesia, continue to express concerns when considering a shift to battery electric vehicles. These concerns relate to purchase price, battery reliability, infrastructure availability, and after-sales service. To overcome the problem of charging infrastructure, the government has taken strategic steps through PLN to accelerate the development of public charging stations (SPKLU) by setting milestones for infrastructure growth at various capacities (7kW–120kW) (Primadya, 2025). Additionally, private sector players such as Starvo and Voltron have supported

ecosystem development by installing charging units in commercial locations such as hotels, malls, and parking lots.

The issue of limited vehicle range has also been addressed through technological advancements in battery R&D, resulting in higher-density batteries. Newer EV models now offer driving ranges between 450–520 km, compared to previous models with 320–400 km range. One approach that is widely discussed to overcome barriers to EV adoption is the battery rental scheme. By separating the battery cost from the vehicle purchase price, this scheme has the potential to reduce the financial burden and risk for consumers (König *et al.*, 2021). It also enables the provision of extended battery warranties and focused after-sales services, which may boost consumer confidence in EV reliability.

To explore this in a structured way, this study employs Conjoint Analysis, which quantifies the trade-offs consumers are willing to make among key product attributes. The study includes an analysis of consumer preferences, willingness to adopt rental models, and perceived trade-offs to identify the optimal combination of price, warranty, and service (Huang *et al.*, 2021). Table 1 summarizes the key attributes and levels used in the analysis.

This research uses Gotion Indonesia as a case study, assessing its potential strategies to drive adoption through innovative battery leasing options. It aims to evaluate how battery rental attributes impact consumer decision-making and to determine which rental configurations are most preferred. While limitations include reliance on survey-based preference modeling, the exclusion of broader regulatory/infrastructure factors, and challenges in generalizing findings outside Indonesia, the study contributes to providing data-driven insights and strategic recommendations to increase EV adoption through an optimized battery leasing model.

The synergy of infrastructure improvement, technological innovation, and the implementation of battery rental schemes is expected to solve the key problems that have so far hindered EV adoption in Indonesia. These combined approaches are expected to drive significant adoption growth and support the broader goal of sustainable mobility transformation.

**Table 1. Attributes of EV Battery Rental Scheme**

| Attribute                      | Description                                    | Level 1 (Low)                                                       | Level 2 (High)                                                                            |
|--------------------------------|------------------------------------------------|---------------------------------------------------------------------|-------------------------------------------------------------------------------------------|
| Purchase Cost                  | Comparing full purchase vs battery rental cost | Full Price (no subsidy) = 100 percent from EV Price IDR 430,000,000 | Very Low Upfront (subsidies + exclude battery) = 60 percent from EV Price IDR 193,500,000 |
| Battery Rental Cost            | Rental Pricing                                 | No cost (battery included in vehicle price)                         | Rental Battery IDR 1,200,000 /month                                                       |
| Battery Performance & Warranty | Battery warranty in certain period             | 8 years                                                             | Lifetime                                                                                  |
| Aftersales Service Quality     | After sales support in certain period          | Standard (8 years free aftersales included spare part & battery)    | Premium (lifetime after sales support include spare part & battery)                       |
| Repair Battery Cost            | Cost of repair or replace battery              | 40 percent of EV Cost IDR 172,000,000                               | Full Covered                                                                              |

Source: Secondary data (processed), 2025.

## METHOD

This study primarily uses structured questionnaires to collect quantitative data from potential electric vehicle (EV) buyers. The questionnaire consists of general questions and specially designed conjoint analysis scenarios to evaluate respondents' preferences in choosing to buy an EV with or without a battery rental scheme. A survey approach is employed because it allows for efficient gathering of large-scale information directly from potential consumers (Kabir, 2016). Conjoint analysis is incorporated within the survey to measure how respondents value different attributes that form a particular product or service, in this case, an EV purchase package (Huertas-García *et al.*, 2016). It also captures the trade-offs they are willing to make when presented with various battery ownership options. By integrating surveys and conjoint analysis, the study yields insights into both respondents' explicit opinions and their implicit preferences when faced with different EV attribute choices.

In the design process of this survey, there are three important categories that are the main focus, namely: (a) socio-demographic questions; (b) introduction to electric vehicles (EV) and barriers of adopting EV questions; and, (c) stated preference EV questions. These three categories are designed to systematically explore the characteristics of respondents, understand the perceptions and barriers faced by consumers in adopting electric vehicles, and measure respondents' preferences for electric vehicles (Buhmann & Criado, 2023). With the integration of these three categories, this survey will provide a holistic picture of the profile of potential EV consumers, the main challenges in EV penetration in the market, and effective strategies to increase the level of EV adoption through battery rental schemes.

The survey arrangements will be aimed at respondents with specific criteria, namely individuals aged at least 18 years, actively working, have an interest in new vehicles, especially electric vehicles, and have the financial potential to purchase an electric vehicle (Buhmann & Criado, 2023). Additional criteria that are also considered are that respondents at least understand the basic concept of electric vehicles, so that they are able to provide relevant responses to the attributes in the survey. The geographical coverage of this survey is focused on the metropolitan area of Jakarta and its surroundings, namely Jakarta, Bogor, Depok, Tangerang, and Bekasi (Jabodetabek), which is a densely populated center with high purchasing power and is the largest potential market for electric vehicles in Indonesia (Uchida *et al.*, 2023).

## Research Methodology

This research employs Choice-Based Conjoint (CBC), a variation of Conjoint Analysis where respondents select their most preferred alternative from presented sets of hypothetical products (Louviere *et al.*, 2000). CBC is particularly suitable for evaluating consumer preferences in scenarios closely resembling actual purchasing decisions, such as electric vehicle purchases with battery rental schemes. Part-worth values or utility scores in conjoint analysis are numerical values that represent the relative preference or level of importance of each product or service attribute level according to consumer perception (Sundararaman & Varghese, 2021). With this estimate, researchers can identify the combination of attributes that consumers prefer most and understand the trade-offs they are willing to make between various product features or aspects. Attribute Importance rank is a quantitative measure that shows how much relative influence each attribute has on consumer decisions or preferences in choosing a product or service (Kusumawati *et al.*, 2021). Attribute

Importance helps companies understand the primary needs of consumers, as well as key factors that can increase product satisfaction and appeal in the market (Saputra *et al.*, 2024).

This research design describes the systematic flow of the research methodology, starting with identifying the background and exploring business problems related to the electric vehicle battery rental scheme. Furthermore, data collection was carried out, including primary data through a conjoint analysis-based survey to understand respondents' preferences in depth, as well as secondary data obtained from literature studies to strengthen the analysis (Putri & Dellyana, 2025). The collected data was then processed using the conjoint analysis method to calculate the utility value (part-worth utilities) and determine the level of attribute importance and its ranking (Kohli, 1988). The results of this analysis form the basis for key findings, which are then used to draw conclusions and provide practical recommendations regarding the implementation of the battery rental scheme in order to increase the adoption of electric vehicles in Indonesia.

## RESULTS

The survey managed to attract the attention of 485 visitors, with a total of 371 responses received and a completion rate of 91.11 percent. Of these, 338 respondents completed the survey in full, while 33 others dropped out. The average filling time was only about 3 minutes, indicating that the survey design was quite concise and efficient. The high completion rate reflects that the majority of respondents did not experience respondent fatigue during the filling process. All respondents came from Indonesia, in accordance with the geographical target of this study.

Based on the final data from 338 respondents who completed the survey in full, indicates that the distribution of data is quite stable and the gender proportion is representative enough to be analyzed in the context of preferences for electric vehicle battery rental schemes. On the age statistics, shows that the majority of respondents are in the productive age group which is the ideal target market for electric vehicles. The distribution of domiciles shows is consistent with the geographic target of the study, namely the Jabodetabek metropolitan area, which has a high concentration of early adoption of electric vehicles. The majority job category indicate that most respondents have a job background with the potential for a steady income or independent financial management. Then, the majority of respondents come from the middle class with the potential purchasing power to consider electric vehicles, especially if offered through alternative financing schemes such as battery rental.

### Consumer Insights on EV Adoption

Based on the survey, it is shows that Wuling and Hyundai's brand awareness and positioning are quite strong in the Indonesian electric vehicle market. Regarding the ideal range, emphasizes that range anxiety is still an important consideration in EV purchasing decisions. The most dominant reasons that are the fears of respondents in buying electric cars are battery durability and cost. Then, emotional and functional approaches are equally important in EV marketing. In answering whether the battery rental scheme is the best solution, shows that the majority of respondents welcome the concept of battery rental as a way to overcome the main barriers to purchasing EVs, such as high initial prices and concerns about battery replacement costs.

Based on CBC analysis, the result in Figure 1 indicating that the battery rental cost attribute has the highest importance (63.9 percent) reinforces the urgency of developing a battery rental scheme as a strategic solution to enhance the attractiveness of electric vehicles in Indonesia by providing financing flexibility and reducing concerns about long-term battery ownership.

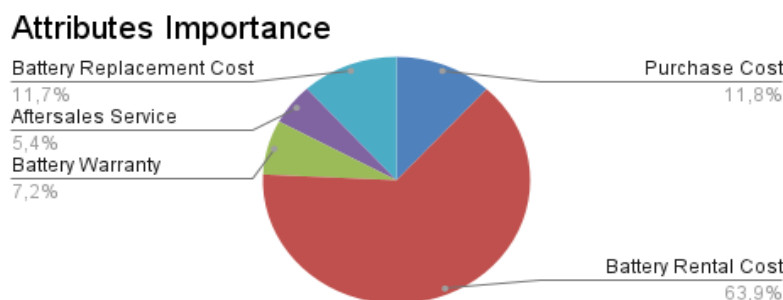


**Figure 1. Attributes Importance pie-chart**

Source: Secondary data (processed), 2025.

**Table 2. Part Worth Utilities**

| Attributes                   | Preference                | Utility Value |
|------------------------------|---------------------------|---------------|
| Purchase Cost                | IDR 430,000,000           | -1.00         |
|                              | IDR 236,500,000           | 0.47          |
|                              | IDR 193,500,000           | 0.53          |
| Battery Rental Cost          | IDR 1,600,000             | -0.33         |
|                              | IDR 800,000               | 1.46          |
|                              | IDR 0                     | -1.13         |
| Battery Performance Warranty | 8 years                   | -0.21         |
|                              | Lifetime                  | 0.21          |
| Aftersales Service Quality   | 3 years Free Maintenance  | -0.14         |
|                              | Lifetime Free Maintenance | 0.14          |
| Battery Replacement Cost     | IDR 172,000,000           | -0.29         |
|                              | Free Battery Replace      | 0.29          |

Source: Secondary data (processed), 2025.

**Table 3. Attributes Combinations**

| Attributes                   | Best Combinations                        | Worst Combinations       |
|------------------------------|------------------------------------------|--------------------------|
| Purchase Cost                | IDR 193,500,000                          | IDR 430.000.000          |
| Battery Rental Cost          | IDR 800,000                              | IDR 0                    |
| Battery Performance Warranty | Lifetime                                 | 8 years                  |
| Aftersales Service Quality   | Lifetime Free Maintenance and Spareparts | Free Maintenance 3 years |
| Battery Replacement Cost     | Free Rattery Replacement                 | IDR 172.000.000          |
| Utility Score                | 2.62                                     | -2.77                    |

Source: Secondary data (processed), 2025.

The results in Table 2 showed the part-worth utility analysis reveal that purchasing cost (IDR 193,500,000; utility value 0.53), battery rental cost (IDR 800,000; utility value 1.46), lifetime battery performance warranty (utility value 0.21), lifetime aftersales service quality (utility value 0.14), and free battery replacement cost (utility value 0.29) significantly influence consumer decisions in choosing electric vehicles with a battery rental scheme. These findings confirm that consumer preferences are greatly impacted by the combination of cost efficiency, technical assurance, and perceptions of service sustainability. Therefore, designing offerings that effectively balance these three aspects is crucial for driving wider adoption of electric vehicles in the Indonesian market. Table

3 confirm that consumers highly value the aspects of sustainability and financial security in choosing an electric vehicle scheme, and tend to reject combinations that offer high-cost risks without long-term protection.

The scenario ranking results from the CBC analysis show that the combination of attributes that consumers prefer the most is the scenario with a purchase price of IDR 193,500,000, a battery rental fee of IDR 800,000 per month, a lifetime battery warranty, after-sales service in the form of free lifetime maintenance and spare parts, and free battery replacement, which obtained the highest total utility score of 2.62. This scenario is considered the most ideal offering because it is able to answer consumers' main concerns regarding initial costs, long-term guarantees, and financial risks related to batteries. In general, scenarios with lower vehicle prices, moderate rental fees, and comprehensive technical guarantees and after-sales services are ranked highest. On the other hand, the scenario with the lowest utility score (−2.77) consists of a combination of attributes that consumers do not prefer at all, namely a purchase price of IDR 430,000,000, a rental fee of IDR 0, a warranty of only 8 years, limited service of 3 years, and a battery replacement fee of IDR 172,000,000. This very low negative value indicates that consumers not only consider the high initial price as the main barrier, but also reject schemes that do not provide long-term certainty, especially regarding the risk of battery damage or replacement.

This ranking pattern consistently shows that Indonesian consumers highly value cost flexibility, long-term protection, and comprehensive after-sales service support. Thus, affordable battery rental schemes accompanied by full protection of the battery and technical services are considered a strategic solution in increasing the adoption of electric vehicles in the domestic market.

In conclusion, market share simulations based on Choice-Based Conjoint (CBC) analysis clearly demonstrate that long-term assurances — particularly lifetime battery warranties and comprehensive after-sales services — are primary drivers influencing consumer preferences in the Indonesian electric vehicle market. These insights can guide manufacturers and policymakers toward the most attractive and commercially viable product configurations to accelerate electric vehicle adoption. Specifically, the market share simulation results indicate that Concept 2 achieves the highest market share (56.7 percent), featuring a purchase price of IDR 236,500,000, battery rental cost of IDR 800,000 per month, lifetime battery and after-sales warranty, and free battery replacement (Table 4). This demonstrates significant consumer sensitivity toward battery rental costs, highlighting that the lowest-priced rental option strongly drives consumer preferences.

**Table 4. Market Share Simulation**

| Concept     | Profile Description                                                                                                                          | Vote Count | Market Share (%) |
|-------------|----------------------------------------------------------------------------------------------------------------------------------------------|------------|------------------|
| Concept - 1 | IDR 193,500,000 purchase price, IDR 800,000 rental fee, Lifetime warranty, Lifetime free maintenance & spare parts, Free battery replacement | 74         | 22.02            |
| Concept - 2 | IDR 236,500,000 purchase price, IDR 800,000 rental fee, Lifetime warranty, Lifetime free maintenance & spare parts, Free battery replacement | 190.5      | 56.7             |
| Concept - 3 | IDR 193,500,000 purchase price, IDR 800,000 rental fee, Lifetime warranty, 3-year free maintenance, Free battery replacement                 | 71.5       | 21.28            |

Source: Secondary data (processed), 2025.

### Estimated Brand Premium

Please setup attribute type to Brand & Price (and price for each level) to view Estimated Brand Premium Report



**Figure 2. Price Elasticity**

Source: Secondary data (processed), 2025.

**Table 5. EV Selling Price**

|                                                                 |                 |
|-----------------------------------------------------------------|-----------------|
| Version 1 (Full EV Price)                                       | IDR 430,000,000 |
| Version 2 (EV Capital Cost + Margin (50%))                      | IDR 193,500,000 |
| Version 3 (EV Capital Cost + Margin (50%) + Half Battery Price) | IDR 236,500,000 |

Source: Secondary data (processed), 2025.

**Table 6. Rental Price Strategy**

|                                                                | Version 1       | Version 2       | Version 3       |
|----------------------------------------------------------------|-----------------|-----------------|-----------------|
| EV PRICE                                                       | IDR 430,000,000 | IDR 193,500,000 | IDR 236,500,000 |
| Depreciation Cost ( <i>Battery Price / Total Month Usage</i> ) | -               | IDR 895,833     | IDR 447,917     |
| Warranty / Risk Cost ( <i>7,5 percent / 8 year</i> )           | -               | IDR 67,188      | IDR 33,594      |
| Cost of Capital ( <i>6 percent / year</i> )                    | -               | IDR 645,000     | IDR 322,500     |
| Rental Cost                                                    | 0               | IDR 1,608,021   | IDR 804,010     |

Source: Secondary data (processed), 2025.

Survey responses in Figure 2 revealed that the majority of participants actively preferred a rental-based battery scheme (IDR 800,000 or IDR 1,600,000) over a full battery ownership model. This preference underscores the practicality and attractiveness of battery-as-a-service offerings, particularly in addressing upfront cost barriers and concerns about battery replacement. This price elasticity analysis confirms that consumers are not only sensitive to the level of monthly rental costs but also fundamentally prefer the concept of battery rental over traditional ownership (Nair *et al.*, 2024). A rental cost of IDR 800,000/month emerged as the optimal price point, balancing affordability with confidence in value delivery, and serves as a strong foundation for a market-oriented EV business model in Indonesia.

### Scenario Explanation and Business Solution

In scenario explanation for electric vehicle price, Table 5 explains the calculation of the selling price of electric vehicles for each proposed scheme. Version 1 is the full price of an electric vehicle without the battery cost deduction (Full EV Price). Version 2 reflects the price of a vehicle without a

battery, calculated from the base cost of the electric vehicle plus a 50 percent profit margin. Meanwhile, Version 3 is a vehicle pricing scheme with battery cost sharing, where 50 percent of the battery cost is included in the selling price of the vehicle. Table 6 shows the basic calculation for monthly battery rental costs of IDR 1,600,000 (Version 2) and IDR 800,000 (Version 3). This rental cost structure consists of battery depreciation costs, a risk or warranty cost of 7.5 percent for an 8-year period (warranty/risk cost), and a capital cost of 6 percent per year (cost of capital).

Referring to Table 2 (Part Worth Utilities), this attribute consistently demonstrates a significant positive utility value in the CBC analysis. Consumers place high importance on battery performance assurance, especially due to concerns about capacity degradation or replacement costs after 8–10 years of use. By providing a lifetime warranty and free battery replacement, Gotion Indonesia can increase consumer confidence in this scheme. However, referring to Table 2, the importance of after-sales service is not as high as the attributes of rental costs or vehicle prices, the analysis results show that preferences remain high for comprehensive and long-term services. By providing free lifetime maintenance and spare parts, consumers will feel more secure and not burdened by unexpected costs.

### **Total Cost of Ownership**

TCO provides a comprehensive overview of all costs incurred throughout the ownership period of a vehicle, making it a valuable tool for comparing different ownership schemes (Ellram, 1995). In this context, TCO includes several key components. The vehicle purchase price represents the initial investment and may vary depending on whether the battery is included in the purchase. The annual operational cost accounts for recurring expenses such as energy consumption (either electricity or fuel), battery rental fees (for rental-based schemes), and routine maintenance. The analysis also considers the length of ownership, typically ranging from five to eight years, to reflect realistic usage cycles. Furthermore, special additional costs such as the expense of battery replacement for full-purchase electric vehicles near the end of their lifecycle are included to ensure a more accurate financial assessment.

Table 7 presents the TCO calculation results for three vehicle scenarios over a 1 to 8-year ownership period. TCO analysis of electric vehicles (EV) compared to conventional gasoline-powered vehicles (ICE) over an 8-year period shows that the battery rental scheme has the lowest total cost of ownership, which is IDR 428,791,840, lower than ICE vehicles of IDR 571,600,000 and EVs with a full battery purchase scheme of IDR 717,491,840. In the long-term perspective, EVs with a battery rental scheme can provide savings of up to IDR 142,808,160 or around 25 percent compared to ICE vehicles. On the other hand, EVs with a full battery purchase scheme actually generate the highest costs due to expensive battery replacements at the end of the usage period (year 8). From a financial perspective, the significant difference between the battery rental scheme and full purchase is mainly due to lower initial outlay factors, controlled monthly costs, and freedom from large battery replacement costs.

### **Discussion**

Gotion Indonesia, as a pioneer in domestic lithium battery manufacturing, possesses several strategic advantages that support the implementation of battery rental schemes. Mastery of core technology, local production capacity, and cost efficiency create a competitive advantage that aligns with the Resource-Based View (RBV), which states that unique and difficult-to-imitate resources can provide a sustainable competitive advantage (Barney, 1991). This advantage is reinforced by the

Domestic Component Level (TKDN) certification, which is relevant to the government's policy of providing incentives in the form of Value Added Tax (VAT) reductions for electric vehicles with a minimum of 40 percent local content (IESR, 2023). Furthermore, a solid after-sales service network in the B2B and OEM segments provides a credible basis for introducing new business models directly to end consumers, as suggested by Relationship Marketing theory, which suggests that quality after-sales service can strengthen customer loyalty (Morgan & Hunt, 1994). However, as part of a global company, Gotion faces internal challenges in the form of cross-border approval processes that can slow the rollout of new schemes; This is in line with research showing that subsidiary-driven innovation is often hampered by internal bureaucracy at the central level (Birkinshaw & Hood, 2001). Externally, Gotion can capitalize on opportunities arising from government policy support, consumer trends toward cost efficiency, and the lack of local competitors in the Battery-as-a-Service (BaaS) space. However, the threat of imminent entry by global players such as CATL and LG could put pressure on pricing and innovation, as well as uncertainty about regulatory incentives, which are strategic risks that must be mitigated.

Analysis using Porter's Five Forces shows that the competitive environment in the Indonesian battery rental electric vehicle industry presents moderate to high pressure. The threat of new entrants is relatively high because the favorable investment climate allows global players to enter through joint ventures or strategic partnerships, a condition explained by Porter (2008) that low barriers to entry tend to intensify competition. Supplier bargaining power is moderate, particularly for battery cell components, which can be reduced through supplier diversification and vertical integration strategies, as companies like BYD have implemented with their mine-to-pack approach. Consumers, on the other hand, have high bargaining power due to their expectations of price flexibility, long warranties, and comprehensive after-sales service. Research on electric vehicle consumer preferences also indicates that concerns about battery costs and service infrastructure are key factors in purchasing decisions (Hoen & Koetse, 2014). Therefore, Gotion needs to emphasize the long-term value of rental schemes compared to full ownership, with education on total cost of ownership (TCO) and risk protection. Competition between existing players is also expected to increase with the entry of global players, so that innovation in IoT-based services, second-life batteries, and the development of integrated ecosystems need to be continuously carried out to maintain the position as a market leader, as the global trend towards integrated services and intelligent ecosystems in the electric vehicle industry (Frost, 2021).

**Table 7. TCO Calculation over 1 to 8-year period**

| Year | ICE             | EV Battery Rental | EV Full Purchase |
|------|-----------------|-------------------|------------------|
| 1    | IDR 290,200,000 | IDR 260,536,480   | IDR 444,436,480  |
| 2    | IDR 330,400,000 | IDR 284,572,960   | IDR 458,872,960  |
| 3    | IDR 370,600,000 | IDR 308,609,440   | IDR 473,309,440  |
| 4    | IDR 410,800,000 | IDR 332,645,920   | IDR 487,745,920  |
| 5    | IDR 451,000,000 | IDR 356,682,400   | IDR 502,182,400  |
| 6    | IDR 491,200,000 | IDR 380,718,880   | IDR 516,618,880  |
| 7    | IDR 531,400,000 | IDR 404,755,360   | IDR 531,055,360  |
| 8    | IDR 571,600,000 | IDR 428,791,840   | IDR 717,491,840  |

Source: Secondary data (processed), 2025.

To ensure the successful implementation of the battery rental scheme, Gotion needs to develop a comprehensive business strategy. A monthly rental rate of IDR 800,000 must be carefully calculated to cover the initial battery investment and break even within 4.5 years, consistent with the break-even analysis approach in strategic marketing and finance literature (Kotler, 2016). Strategic partnerships with OEMs are crucial to separate vehicle production from battery supply while still meeting the local content (TKDN) threshold for government incentives. A risk management strategy is also necessary, setting aside a reserve fund of 7.5 percent of each rental payment for the battery warranty, as is standard industry practice to ensure long-term service credibility (Saccani *et al.*, 2007). IoT-based technology support for the Battery Management System (BMS) is required to provide real-time control and safety features such as automatic shutdown in the event of default or battery misuse, an approach identified as improving operational efficiency and service security (Leviäkangas *et al.*, 2019). In addition, the residual value of batteries can be maximized through the utilization of second-life for ESS (Energy Storage System) applications, which strengthens business sustainability and is in line with the concept of a circular economy (Casals *et al.*, 2019). Finally, market education campaigns regarding TCO and the benefits of the BaaS model need to be implemented aggressively, involving public figures and industry practitioners so that this scheme is widely accepted by Indonesian consumers, as the Diffusion of Innovation theory states the importance of the role of opinion leaders in accelerating innovation adoption (Rogers, 2003).

## CONCLUSION

Based on a survey and conjoint analysis, Indonesian consumers have three primary concerns regarding electric vehicle batteries, which are the high cost of battery replacement (up to 60 percent of the vehicle price), battery capacity degradation (SOH degradation), and limited warranty and after-sales service. The high price of batteries (over IDR 170 million) and the perception of limited battery life are major barriers for potential buyers.

CBC's analysis indicates that the best battery rental scheme consists of an electric vehicle priced at IDR 236.5 million with a monthly rental fee of IDR 800,000, complete with a lifetime warranty, free battery replacement, and free maintenance. This scheme has the highest utility value (2.57) and the largest simulated market share (56.7 percent). From a financial perspective, the Total Cost of Ownership (TCO) over an eight-year period with this scheme is approximately IDR 429 million, 25 percent more economical than a gasoline vehicle, and 40 percent more economical than an EV with a full battery purchase. By eliminating the risk of expensive battery replacement costs (IDR 172 million), battery rental schemes significantly increase the perceived value of electric vehicles, making them a more economical and worry-free solution.

This study has several limitations, including the geographic scope of respondents being largely confined to large cities, the conjoint analysis attributes being limited to key aspects only, and the failure to test the effectiveness of marketing communications related to battery rental schemes. Future research is recommended to expand the geographic scope, add scenario attributes, and test Battery-as-a-Service marketing communications strategies in greater depth.

## ACKNOWLEDGEMENT

The authors would like to thank the supervisor for the guidance, direction, and valuable suggestions during the process of compiling this journal. The authors would also like to thank individuals in the Jakarta metropolitan area who have provided support in the form of important data

and information in this research. The authors would also like to thank colleagues and friends who always provide encouragement and enthusiasm. The deepest gratitude is also addressed to the beloved family who always provide prayers and endless support.

## REFERENCES

- Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of Management*, 17(1), 99–120. <https://doi.org/10.1177/014920639101700108>.
- Birkinshaw, J., & Hood, N. (2001). Unleash innovation in foreign subsidiaries. *Harvard Business Review*, 79(3), 131–137. <http://doi.org/10.13140/RG.2.2.34558.02883>.
- BKPM. (2022). Buku statistik realisasi investasi berdasarkan sektor tahun 2022. *Kementerian Investasi dan Hilirisasi/BKPM*. <https://www.bkpm.go.id/id/info/artikel/book/buku-statistik-realisasi-investasi-berdasarkan-sektor-tahun-2022>.
- Buhmann, K. M., & Criado, J. R. (2023). Consumers' preferences for electric vehicles: The role of status and reputation. *Transportation Research Part D: Transport and Environment*, 114(January), 103530. <https://doi.org/10.1016/j.trd.2022.103530>.
- Casals, L. C., Amante García, B., & Canal, C. (2019). Second life batteries lifespan: Rest of useful life and environmental analysis. *Journal of Environmental Management*, 232, 354–363. <https://doi.org/10.1016/j.jenvman.2018.11.046>.
- Ellram, L. M. (1995). Total cost of ownership: An analysis approach for purchasing. *International Journal of Physical Distribution & Logistics Management*, 25(8), 4–23. <https://doi.org/10.1108/09600039510099928>.
- Frost & Sullivan. (2021). *Battery-as-a-service: future of EV battery business models*. Frost & Sullivan Report. <https://www.frost.com/growth-opportunity-news/mobility-automotive-transportation/powertrain-electric-vehicles/battery-as-a-service-baas-poised-to-disrupt-the-global-electric-vehicle-ev-market/>.
- Hakam, D. F., & Jumayla, S. (2024). Electric vehicle adoption in Indonesia: Lesson learned from developed and developing countries. *Sustainable Futures*, 8(December), 100348. <https://doi.org/10.1016/j.sftr.2024.100348>.
- Hoen, A., & Koetse, M. J. (2014). A choice experiment on alternative fuel vehicle preferences. *Transportation Research Part A: Policy and Practice*, 61, 199–215. <https://doi.org/10.1016/j.tra.2014.01.008>.
- Huang, Y., Qian, L., Soopramanien, D., & Tyfield, D. (2021). Buy, lease, or share? Consumer preferences for innovative business models in the market for electric vehicles. *Technological Forecasting and Social Change*, 166(20), 120639. <https://doi.org/10.1016/j.techfore.2021.120639>.
- Huertas-García, R., Nuñez-Carballosa, A., & Miravittles, P. (2016). Statistical and cognitive optimization of experimental designs in conjoint analysis. *European Journal of Management and Business Economics*, 25(3), 142–149. <https://doi.org/10.1016/j.redee.2015.10.001>.
- IEA. (2023). Global EV outlook 2023 – Trends in charging infrastructure. *International Energy Agency*. <https://www.iea.org/reports/global-ev-outlook-2023>.
- IEA. (2024). *Global EV outlook 2024 – Moving towards increased affordability*. *International Energy Agency*. <https://www.iea.org/reports/global-ev-outlook-2024>.
- IEEFA. (2022). Press release: Kendaraan listrik. *Institute for Energy Economics and Financial Analysis*. [https://ieefa.org/sites/default/files/2023-02/Press%20release\\_Bahasa%20final\\_Siaran%20Pers%20IEEFA%20-%20Kendaraan%20Listrik.pdf](https://ieefa.org/sites/default/files/2023-02/Press%20release_Bahasa%20final_Siaran%20Pers%20IEEFA%20-%20Kendaraan%20Listrik.pdf).
- IESR. (2022). Indonesia energy transition outlook (IETO) 2022. *Study Report*. <https://iesr.or.id/en/pustaka/indonesia-energy-transition-outlook-ieto-2022/>.

- IESR. (2023). Indonesia electric vehicle outlook 2023. *Study Report*. <https://iesr.or.id/en/pustaka/indonesia-electric-vehicle-outlook-2023/>.
- IESR. (2024). Indonesia energy transition outlook 2024. *Study Report*. <https://iesr.or.id/pustaka/indonesia-energy-transition-outlook-ieto-2024/>.
- Kabir, S. (2016). *Methods of data collection*. Book Zone Publications.
- Kohli, R. (1988). Assessing attribute significance in conjoint analysis: Nonparametric tests and empirical validation. *Journal of Marketing Research*, 25(2), 123-133. <https://doi.org/10.1177/002224378802500201>.
- König, A., Nicoletti, L., Schröder, D., Wolff, S., Waclaw, A., & Lienkamp, M. (2021). An overview of parameter and cost for battery electric vehicles. *World Electric Vehicle Journal*, 12(1), 21. <https://doi.org/10.3390/wevj12010021>
- Kotler, P., & Keller, K. L. (2016). *Marketing management (15<sup>th</sup> ed.)*. Pearson Education.
- Kusumawati, K., Saragi, S., & Putriana, L. (2021). Analysis of the influence of product attributes and consumer characteristics on consumer preferences and purchase decisions of vitamin C oral products during the Covid-19 pandemic. *Journal of Management*, 12(1), 751-763. <https://doi.org/10.35335/enrichment.v12i1.302>.
- Leviäkangas, P., Aapaoja, A., Kinnunen, T., & Pilli-Sihvola, E. (2019). The internet of things and digitalisation of transport systems. *Transportation Research Procedia*, 41, 229–233. <https://doi.org/10.1016/j.trpro.2019.09.042>.
- Louviere, J., Hensher, D., & Swait, J. (2000). *Stated choice methods: Analysis and application*. Cambridge University Press. <https://doi.org/10.1017/CBO9780511753831.008>.
- Ministry of Energy and Mineral Resources. (2023). Emerging technologies to achieve net zero emission in Indonesia 2060. *Ministry of Energy and Mineral Resources, Indonesia*. <https://www.esdm.go.id/id/media-center/arsip-berita/capai-emisi-nol-bersih-pemerintah-serius-kembangkan-kendaraan-listrik>.
- Ministry of Industry. (2022). *Contribution of the automotive sector in reducing carbon emissions*. <https://www.gaikindo.or.id/wp-content/uploads/2022/08/02.-Bahan-Dirjen-ILMATE-Kontribusi-Otomotif-Penurunan-CO2-V7.pdf>.
- Morgan, R. M., & Hunt, S. D. (1994). The commitment-trust theory of relationship marketing. *Journal of Marketing*, 58(3), 20–38. <https://doi.org/10.2307/1252308>.
- Nair, S., Viri, R., Mäkinen, J., Pöllänen, M., Liimatainen, H., & O'Hern, S. (2024). Effect of policies to accelerate the adoption of battery electric vehicles in Finland — A Delphi study. *Future Transportation*, 4(1), 67-91. <https://doi.org/10.3390/futuretransp4010005>.
- Ouyang, D., Zhou, S., & Ou, X. (2021). The total cost of electric vehicle ownership: A consumer-oriented study of China's post subsidy era. *Energy Policy*, 149, 112023. <https://doi.org/10.1016/j.enpol.2020.112023>.
- Porter, M. E. (2008). The five competitive forces that shape strategy. *Harvard Business Review*, 86(1), 78–93. <https://hbr.org/2008/01/the-five-competitive-forces-that-shape-strategy>.
- Primadya, R. (2025). SPKLU bakal makin menjamur, PLN tambah 6 mitra strategis perkuat ekosistem EV di tanah air. *Press Release*, No. 103.PR/STH.01.05/V/2025 tanggal 25 Mei. PT. PLN Persero. <https://web.pln.co.id/cms/media/siaran-pers/2025/05/spklu-bakal-makin-menjamur-pln-tambah-6-mitra-strategis-perkuat-ekosistem-ev-di-tanah-air/>.
- Putri, D. A., & Dellyana, D. (2025). Understanding coffee shop consumer preferences in Bandung: A conjoint analysis approach for nama coffee's expansion. *Eduvest - Journal of Universal Studies*, 5(8), 9801–9819. <https://doi.org/10.59188/eduvest.v5i8.50830>.
- PwC. (2021). *Cost of capital study 2021: The calm before the storm – Rising risks, stable returns?* PwC Global. <https://www.pwc.com/id/en/publications/automotive/indonesia-electric-vehicle-readiness-consumer-insights-2024.pdf>.

- Rogers, E. M. (2003). *Diffusion of innovations* (5<sup>th</sup> edition). Free Press.
- Saccani, N., Johansson, P., & Perona, M. (2007). Configuring the after-sales service supply chain: A multiple case study. *International Journal of Production Economics*, 110(1–2), 52–69. <https://doi.org/10.1016/j.ijpe.2007.02.013>.
- Saputra, M. C., & Andajani, E. (2023). Analysis of factors influencing intention to adopt battery electric vehicle in Indonesia. *ADI Journal on Recent Innovation*, 5(2), 100–109. <https://doi.org/10.34306/ajri.v5i2.993>.
- Saputra, R. H., Mariam, S., & Ramli, A. H. (2024). The Effect of service quality and customer satisfaction on customer loyalty in coffee shop. *Jurnal Ilmiah Manajemen Kesatuan*, 12(5), 1697–1714. <https://doi.org/10.37641/jimkes.v12i5.2824>.
- Sundararaman, B., & Varghese, N. (2021). Utilization of conjoint analysis in understanding consumer preferences for footwear. *Current Trends in Fashion Technology & Textile Engineering*, 7(2), 555710. <https://doi.org/10.19080/CTFTTE.2019.05.555710>
- Uchida, H., Prasad, A., Do, T., Le, D., Chatisarawich, V., & Tran, D(B). (2023). Unleashing Indonesia's electric mobility potential. *Report 2023*. Arthur D. Little (ADL). [https://www.adlittle.com/sites/default/files/reports/ADL\\_Indonesias\\_emobility\\_potential\\_2023.pdf](https://www.adlittle.com/sites/default/files/reports/ADL_Indonesias_emobility_potential_2023.pdf).
- Widiyandaria, H., Latifah, R. A., Jumari, A., Yudha, C. S., & Nisa, S. S. (2022). Sintesis material katoda  $\text{LiNi}_{0.8}\text{Mn}_{0.1}\text{Co}_{0.1}\text{O}_2$  (NMC811). *ALCHEMY Jurnal Penelitian Kimia*, 18(2), 214–220. <https://doi.org/10.20961/alchemy.18.2.63035.214-220>.
- WRI Indonesia. (2025). Indonesian government prepares roadmap for clean net-zero industry by 2050. *Press Release*, August 22. <https://wri-indonesia.org/en/news/indonesian-government-prepares-roadmap-clean-net-zero-industry-2050>.