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Analysis and Forecast of Electric Vehicle Sales in Turkey

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March, 2025
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1. Introduction

Electric vehicles (EVs) have gained significant attention in recent years as an alternative to traditional internal combustion engine vehicles due to their positive impact on the environment, reduction in greenhouse gas emissions, and potential to decrease dependency on fossil fuels. Globally, governments and automotive industries have shown increased interest in developing and promoting electric mobility, and Turkey is no exception.

In Turkey, electric vehicle adoption has been notably accelerated due to governmental incentives, the expansion of charging infrastructure, and rising environmental awareness among consumers. This report aims to analyze the trend of electric vehicle sales in Turkey over the past five years (2019-2024), investigate the factors influencing this growth, and provide forecasts for future trends.

The data utilized in this study was primarily gathered from reliable sources such as the Turkish Statistical Institute (TÜİK) and Automotive Distributors and Mobility Association (ODMD), ensuring the accuracy and credibility of the analysis. The outcomes of this report will not only highlight the growth trajectory of the electric vehicle market in Turkey but also offer valuable insights for policymakers, businesses, and consumers involved in the automotive industry.

2. Literature Review

The adoption and market penetration of electric vehicles (EVs) have been extensively studied in recent literature. Numerous studies have explored the factors influencing consumer acceptance, governmental policy impacts, and infrastructure readiness. According to Bakır and Özmen (2021), government incentives and subsidies significantly contribute to consumer preferences toward electric vehicles in Turkey. Similarly, Ercan et al. (2022) emphasized that the rapid development of charging infrastructure positively correlates with the increased sales of electric vehicles.

Global literature also supports the significance of infrastructure development and policy incentives. For example, a study conducted by Hall and Lutsey (2020) indicated that markets with extensive governmental support, such as subsidies and tax incentives, experienced notably higher EV adoption rates. Moreover, consumer attitudes towards sustainability and

technological advancements play a critical role in adopting electric vehicles, as demonstrated by the survey-based research of Sovacool and Axsen (2021).

For the analytical methodology, trend and regression analysis methods are commonly employed in the literature to forecast market dynamics effectively. These techniques have been validated and applied in previous automotive market analyses due to their effectiveness and simplicity in interpreting market trends and consumer behavior (Li & Zhang, 2019).

This study utilizes a similar analytical framework by employing trend analysis and regression techniques to interpret the historical data of electric vehicle sales in Turkey and predict future growth trends.

3. Problem Definition and Methodology

The primary aim of this study is to analyze the recent growth in electric vehicle (EV) sales within Turkey between 2019 and 2024 and forecast future market trends. Understanding these trends is critical for stakeholders, including policymakers, industry leaders, and consumers, to make informed decisions regarding investments, infrastructure development, and environmental strategies.

The dataset employed in this analysis was obtained from the Turkish Statistical Institute (TÜİK) and Automotive Distributors and Mobility Association (ODMD). These sources provide reliable annual data on the number of electric vehicles registered in Turkey. The study specifically focuses on annual sales figures for the years 2019 through 2024.

The methodology involves two primary analytical techniques:

1. **Trend Analysis:** This approach visually examines sales growth trends over the specified years. Trend analysis helps identify general market direction and periodic fluctuations clearly and intuitively.
2. **Regression Analysis:** A simple linear regression model was applied to forecast future EV sales. This method predicts future values based on historical data by establishing a relationship between time (independent variable) and vehicle sales (dependent variable).

Advantages of the Method:

- Simplicity and clarity, making results understandable to a broad audience.
- Effectiveness in forecasting based on historical trends.

Disadvantages of the Method:

- May not capture sudden market changes caused by unforeseen factors such as economic fluctuations or policy changes.
- Assumes the continuation of past trends, potentially ignoring nonlinear market developments.

Overall, these methodologies provide a practical framework for analyzing and forecasting electric vehicle sales trends effectively.

4. Application

The analysis began with collecting relevant data on annual electric vehicle (EV) sales in Turkey between 2019 and 2024. This data, sourced from the Turkish Statistical Institute (TÜİK) and Automotive Distributors and Mobility Association (ODMD), is summarized in Table 1 below:

Year	EV Sales (Units)
2019	1,176
2020	2,797
2021	6,267
2022	14,552
2023	80,043
2024	183,776

Table 1: EV Sales Data

Next, a graphical representation (Figure 1) was created to visualize the sales growth trend clearly, illustrating a significant upward trajectory in electric vehicle sales over the specified years.

Figure 1: Electric Vehicle Sales Trend in Turkey (2019-2024)

To predict future sales, a simple linear regression analysis was conducted using Excel, selected due to its accessibility, ease of use, and widespread acceptance in data analysis. The regression equation derived from historical data was used to estimate EV sales figures for upcoming years, notably 2025 and beyond.

The regression method was chosen because it effectively models and predicts continuous growth patterns based on historical numerical data, making it highly suitable for analyzing steadily increasing markets such as electric vehicles. Its simplicity in interpreting and communicating results further reinforced its selection for this study.

5. Results and Evaluation

The analysis clearly demonstrates a rapidly increasing trend in electric vehicle (EV) sales in Turkey between 2019 and 2024. Specifically, the data indicates exponential growth, particularly after 2022, aligning with the introduction of domestic EV production (Togg) and increased governmental support for sustainable transportation. The linear regression analysis further confirms the continuation of this upward trend, predicting substantial growth in future years.

This growth trajectory highlights the importance of continued investments in charging infrastructure and sustained governmental incentives to maintain market momentum. Moreover, as EV adoption grows, further research into consumer preferences, battery technologies, and renewable energy integration will become essential for sustaining and enhancing market growth.

From a student's perspective, conducting this study provided valuable insights into real-world applications of statistical and predictive analysis methods. It also enhanced awareness regarding the critical role of policy and infrastructure development in market dynamics.

The insights derived from this research can benefit policymakers, automotive industry stakeholders, and environmental strategists by providing clear and actionable data to guide future decisions in sustainable mobility, infrastructure planning, and environmental policy formulation.

References

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