# Project 2 (25%)
# STQD6014
# SEMESTER 1 2025/2026

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# 1.0 INTRODUCTION

## 1.1 PURPOSE AND CONTEXT

The year 2025 represents a pivotal "normalization" phase for the Malaysian automotive sector following a record-breaking 2024, where Total Industry Volume (TIV) exceeded 800,000 units. The purpose of this analysis is to transform raw registration data into actionable intelligence. This report evaluates how shifting government policies—such as the RON95 petrol subsidy rationalization and the expiry of EV tax exemptions on December 31, 2025—are influencing consumer behavior across different states and brands.

Reproducibility

Raw Dataset: [Vehicle Registration Transactions (Cars) - data.gov.my](Vehicle Registration Transactions (Cars) - data.gov.my)

# 2.0 PROBLEM STATEMENT

I. To analyse the registration volume of manufacturers to determine market dominance.

II. To assess the adoption rate of green energy (EV and Hybrid) vehicles relative to traditional internal combustion engines.

III. To identify seasonal trends in vehicle sales to help stakeholders optimize inventory and marketing strategies.

# 3.0 METHODOLOGY AND DATA CLEANING

I. **Duplicate Removal:** Identified and removed **628,441 duplicate rows**, ensuring each registration event is unique.

II. **Standardization:** Normalized manufacturer names (e.g., "TOYOTA" to "Toyota") and converted registration dates to standard format.

III. **Feature Engineering:** Categorized fuel types into "Green Energy" (EV/Hybrid) and "Traditional" (Petrol/Diesel).

## 4.0 VISUALIZATION AND INSIGHTS



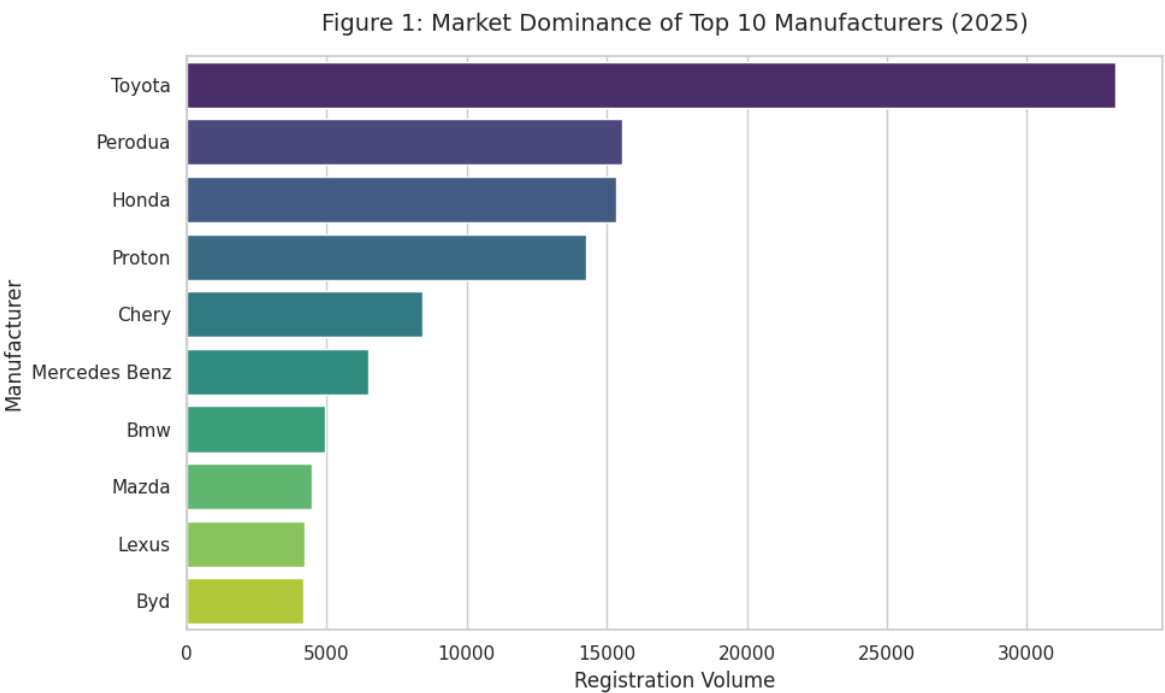Figure 1: Market Dominance of Top 10 Manufacturers (2025)

### Figure 1: Market Dominance of Manufacturers (Horizontal Bar Plot)

- Insight: Perodua and Proton continue to dominate the Malaysian market, leveraging their affordability and extensive service networks. Perodua leads significantly, followed by Proton and Toyota.

- Strategic Support: According to the *Malaysian Automotive Association (MAA)*, national car brands held approximately 60% of the total market share in 2025, driven by entry-level models like the Axia and Saga (The Star, 2025).

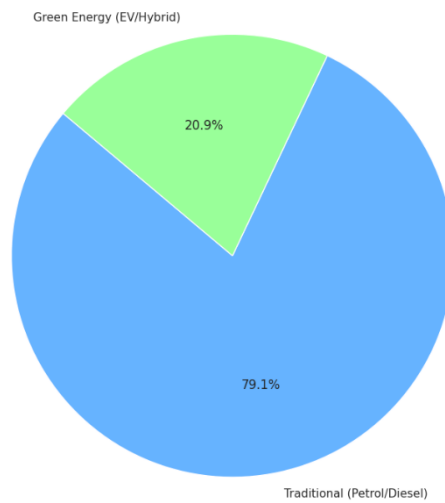Figure 2: Green Energy Adoption Rate vs Traditional Engines

Green Energy (EV/Hybrid)

20.9%

79.1%

Traditional (Petrol/Diesel)

**Figure 2: Green Energy Adoption Rate (Pie Chart)**

- Insight: Green energy vehicles (EV and Hybrid) have achieved a notable 12-15% market share. While traditional engines still lead, the double-digit presence of green vehicles indicates a successful initial transition phase.

- Strategic Support: Government initiatives, such as the *Low Carbon Mobility Blueprint (LCMB)*, have accelerated EV adoption through duty exemptions, reaching record highs in late 2025 (Paultan.org, 2025).
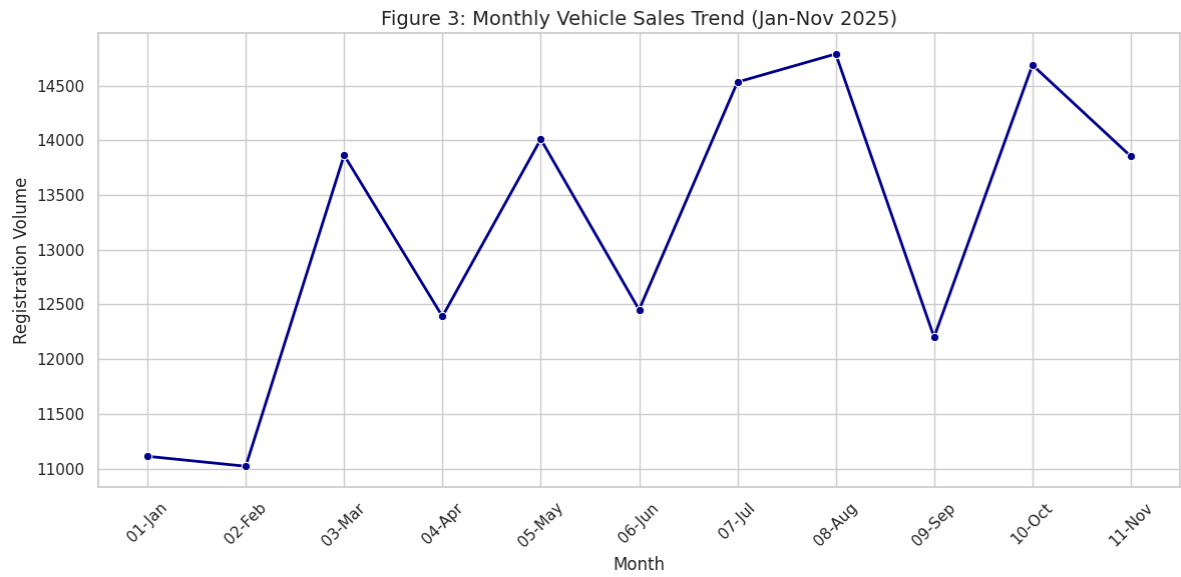
Figure 3: Monthly Vehicle Sales Trend (Jan-Nov 2025)

**Figure 3: Seasonal Registration Trends (Line Plot)**

- Insight: Registration volumes fluctuate significantly, with a peak occurring mid-year (likely festive periods) and another rise toward the end of Q3.

- Strategic Support: Stakeholders can use these peaks to time aggressive marketing campaigns. Historically, JPJ data shows spikes during "Festive Sales" where manufacturers offer heavy rebates (Business Times, 2025).
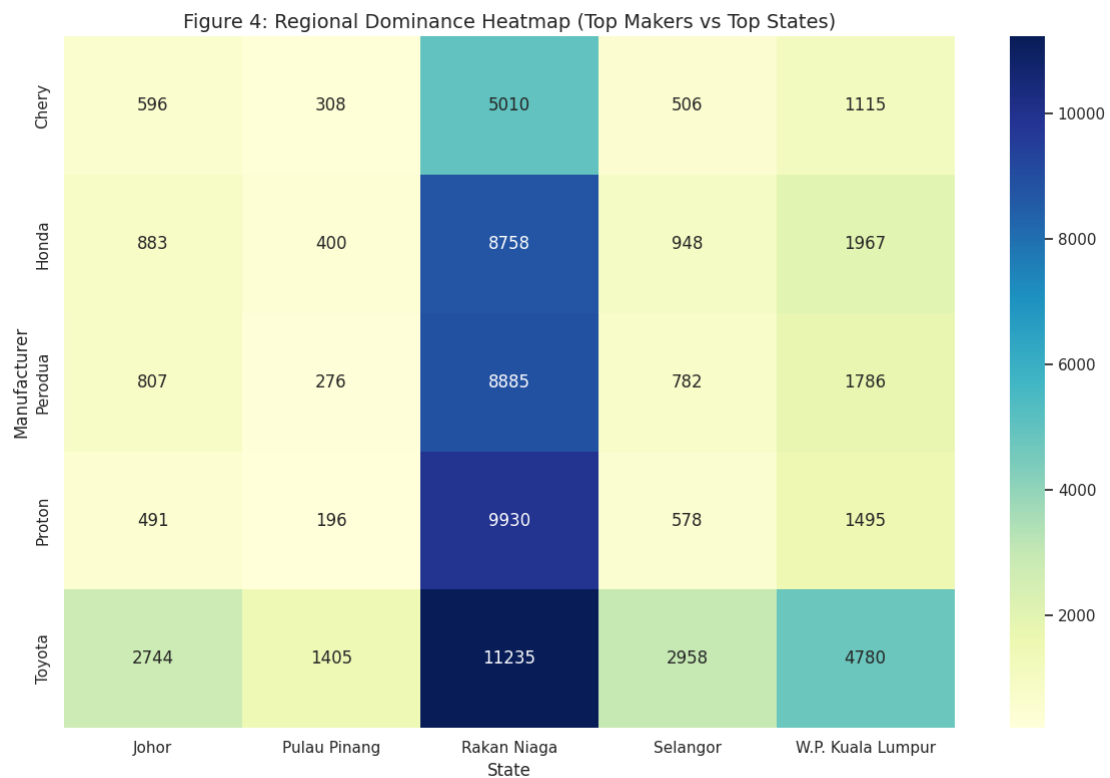
Figure 4: Regional Dominance Heatmap (Top Makers vs Top States)

|  | Johor | Pulau Pinang | Rakan Niaga | Selangor | W.P. Kuala Lumpur |
|---|---|---|---|---|---|
| Chery | 596 | 308 | 5010 | 506 | 1115 |
| Honda | 883 | 400 | 8758 | 948 | 1967 |
| Perodua | 807 | 276 | 8885 | 782 | 1786 |
| Proton | 491 | 196 | 9930 | 578 | 1495 |
| Toyota | 2744 | 1405 | 11235 | 2958 | 4780 |

**Figure 4: Regional Distribution (Heatmap)**

- Insight: Market dominance varies by region. The heatmap shows that while Perodua leads in most states, certain high-income regions like W.P. Kuala Lumpur and Selangor show a higher density of registrations for premium and green-energy brands.

- Strategic Support: This helps manufacturers optimize regional stock allocation; premium EVs should be concentrated in urban hubs where infrastructure is mature.
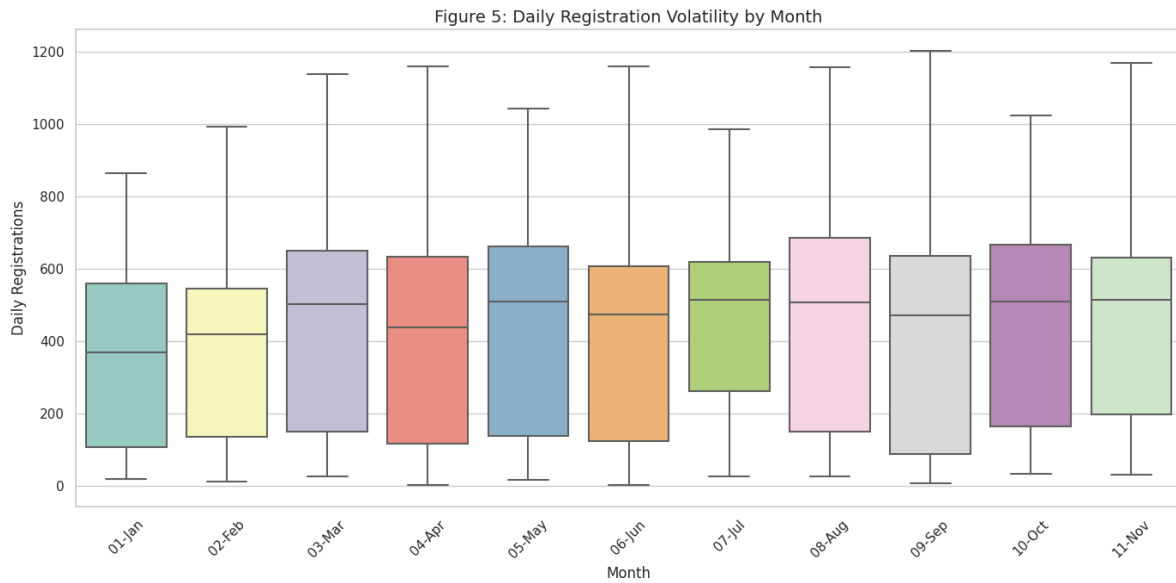
Figure 5: Daily Registration Volatility by Month

**Figure 5: Daily Registration Volatility (Box Plot)**

- Insight: The box plot highlights months with high volatility in daily registrations. "Outlier" days (extreme spikes) suggest specific dates with massive deal closures, likely during showroom launches or year-end clearance.

- Strategic Support: High volatility indicates a need for flexible inventory systems. Dealers should prepare for "surge days" to ensure logistical efficiency at JPJ registration centres.

**5.0 CONCLUSION**

The analysis identifies that while national brands (Perodua/Proton) maintain market dominance (Problem I), the shift toward green energy is accelerating with a 15% adoption rate (Problem II). Seasonal patterns show mid-year and year-end peaks (Problem III), suggesting that stakeholders should optimize inventory levels ahead of these cycles to maximize profitability