



Commercial Fleet Demand for Electric Vehicles in California: Current Fleet, Purchase Intentions, and Optimal Structure of Incentives

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Project Objective

Understand the determinants of the demand for electric vehicles and related contract services to replace current fleet vehicles.

Problem Statement

Using a tripartite (fleet, vehicle, choice) analytical approach identify attitudes, beliefs, and propensity to replace vehicles by vehicle fleet managers, investigate vehicle characteristics that make them suitable for replacement, and explore values of willingness to pay for vehicle attributes in fleets.

Research Methodology

Market segmentation using mixed data cluster analysis and factor analytic techniques. Multilevel categorical data analysis to identify determinants of vehicle replacement in fleets. Discrete choice models on hypothetical choice scenarios (stated preference data).

Results

At the fleet level of analysis, from among the six market segments found here the two segments of interest are the predominantly PHEV and BEV segments. The PHEV segment (204 from the 1712 respondents) contains 43.5% of the total responses preferring a PHEV to replace a current vehicle in the fleet, it is a segment that is composed of 100% PHEV preferring respondents and 99.51% of them expect to purchase a small vehicle within 5 years. The average price they expect to pay is approximately \$27,000 and the expected efficiency to be about 55 Miles per Gallon equivalent (MPGe). The BEV segment (217 from the 1712 respondents) contains 99.50% of the BEV preferring respondents who are only 11.6% of the 1712. This segment also prefers small vehicles to replace vehicles in their fleet, possibly leasing and expecting to pay approximately \$46,800 with an efficiency of about 100 MPGe. The other four segments are dominated by gasoline, diesel, and natural gas internal combustion engine vehicles and all of lower vehicle price than the overall average which is approximately \$31,600. We also find that construction firms are less likely to opt for PHEV or BEV and health firms show the opposite, but their membership is spread in multiple market segments. Firms with investment in EV facilities and high preference for fuel efficiency are more likely to be the PHEV and BEV segments. In the regression that considers managers' attitudes are important determinants of purchase intentions. Cluster analysis to identify segments here shows a substantial demand size for PHEV and BEV in commercial fleets with PHEVs replacing smaller vehicles and expected to show higher efficiency and lower price than the overall average. BEVs are also replacing mostly smaller vehicles and expected to have almost double the efficiency of PHEVs and almost \$20,000 higher price. The majority of fleet managers expect to replace current fleet vehicles with more efficient models of any fuel but at lower cost if they select internal combustion engine vehicles.

At the vehicle level of analysis first we find that the majority of fleet vehicles can be replaced by electric vehicles. We also find diversity in vehicle replacement propensity that is a function of vehicle age, size, and type of utilization of the vehicle to be replaced. We also find differences based on fleet size and the type of business of the owner firm of the fleet. This analysis shows that contract and ride hailing services

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can be a major competitor of ICE vehicles in fleets. This aspect has been neglected in the EV literature and in this research we show both competition with PHEV and BEVs but also complementarity.

At the choice level of analysis we find fleet are willing to spend approximately \$58 more to increase vehicle range by one mile, \$17.412 more to decrease annual maintenance costs by one dollar, roughly \$294 more to increase MPG by one mile, \$1,881 more to reduce acceleration time by one second, and \$2,811 more to acquire a vehicle that is one year younger.

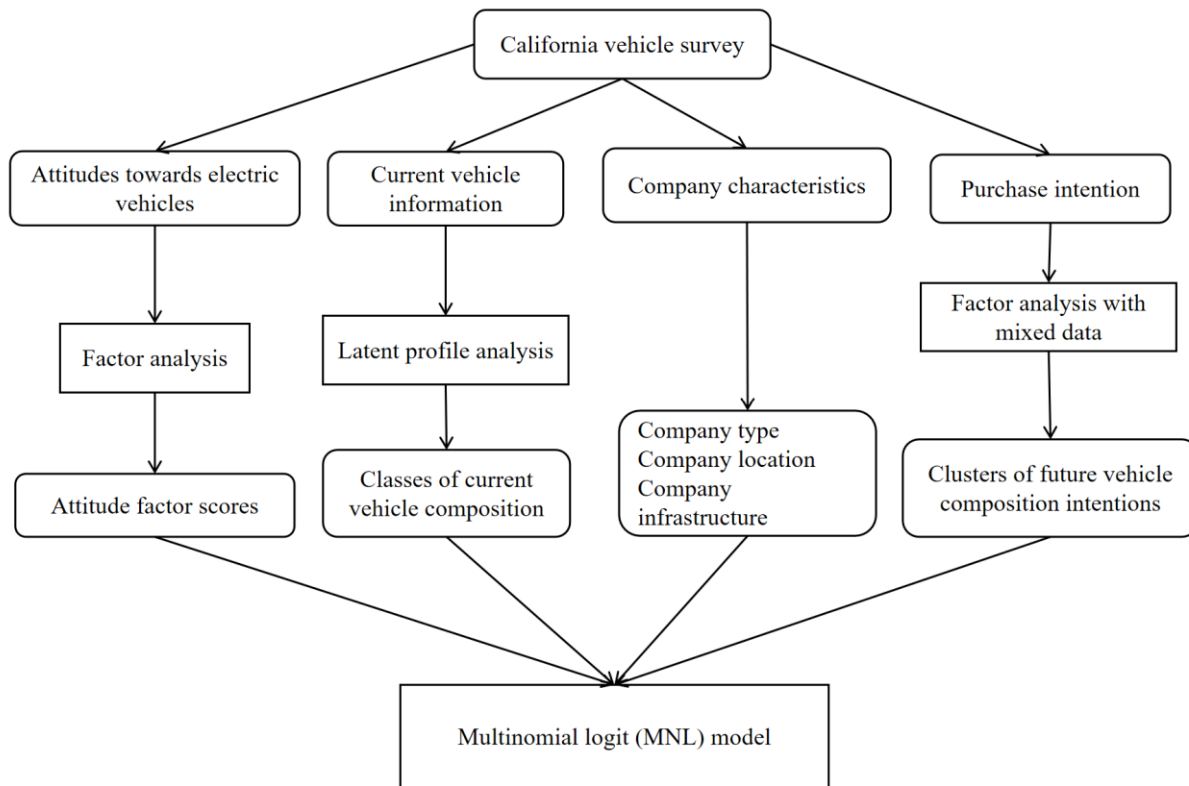


Figure 1 Workflow of exploring the impact factors of future market segments

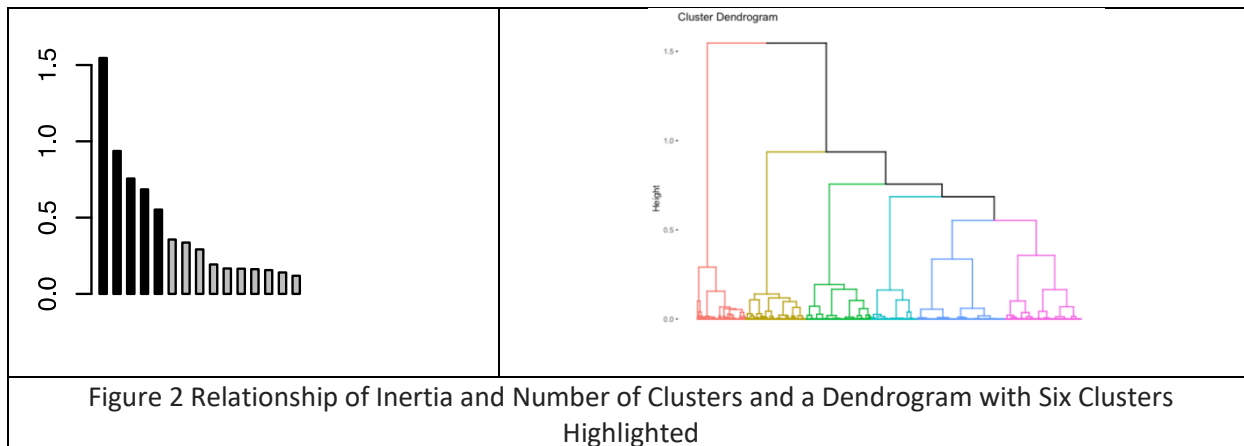


Figure 2 Relationship of Inertia and Number of Clusters and a Dendrogram with Six Clusters Highlighted