

Analysis and Segmentation of the Indian Electric Vehicle Market

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Project Link: <https://github.com/Shivani02603/Electric-Vehicle-Market-FeynnLabs.git>



Executive Summary

This report presents a data-driven market segmentation for launching electric vehicles (EVs) in India by integrating: (1) multi-source vehicle analyses for cars and two-wheelers and (2) K-Means-based customer clustering. On the vehicle side, hatchbacks lead cars by market share and affordability (market share $\approx 42.8\%$; avg. price $\approx ₹3.8\text{L}$), while cruiser bikes top two-wheelers on attractiveness (overall score ≈ 95.16 ; avg. price $\approx ₹10.17\text{L}$). On the customer side, four distinct clusters emerge with clear age, spending, work experience, and family-size differences, enabling precise product-to-segment matching. Combining supply signals (market share, normalized popularity, price) with demand profiles yields three immediate launch priorities: electric hatchbacks for “Young Family Commuters” (Cluster C, age 30–40), electric cruiser bikes for “Premium Bike Enthusiasts” (Cluster B, age 45–55), and electric scooters for “Budget Urban Riders” (a value option within Cluster C).

A phased GTM plan follows from these insights. Phase 1 (Year 1) targets roughly 70% of viable demand via three segments: Hatchback \rightarrow Segment C ($\approx 35\%$), Cruiser Bike \rightarrow Segment B ($\approx 20\%$), and Scooter \rightarrow Segment C ($\approx 15\%$). Phase 2 (Years 2–3) expands Hatchback to Segment B ($\approx 20\%$) with premium variants. Phase 3 (Year 3+) introduces an Electric Commuter Bike for “Entry-Level Youth” (Cluster D, $\approx 5\%$) once costs further decline. “Retired Affluent” (Cluster A, age 75+) is not prioritized for early EV adoption. This integrated pipeline, built on standardized preprocessing, min-max normalization for cross-source comparability, weighted scoring (popularity 40%, market share 35%, affordability 25%), and transparent clustering/profiling, converts heterogeneous data into clear, actionable launch decisions.

Background and Industry Context

EVs replace the internal combustion powertrain with a battery-inverter-motor stack that delivers high efficiency, low routine maintenance, and instant torque—attributes that suit India’s congested, stop-go urban conditions. Lithium-ion chemistries set the cost-range-charging frontier today, while power electronics and thermal management determine robustness in India’s climates. Body-type choices matter for perceived value: hatchbacks (compact footprint, lower curb weight) often translate battery capacity into practical urban range at accessible price points; among two-wheelers, cruiser ergonomics can justify premium positioning when range-confidence and ride comfort align with mid-career buyers’ expectations.

Adoption is accelerating where three forces intersect: falling battery costs and OEM scale, national/state incentives that compress total cost of ownership, and denser charging in metro corridors. Frictions remain: uneven charging access, evolving resale norms, and high upfront price sensitivity. Rigorous segmentation therefore becomes the mechanism that aligns engineering realities (range, charging, TCO) with commercial levers (pricing, positioning, channels). Our integration specifically identifies Cluster C (age 30–40; ≈ 5.7 years work experience; family size ≈ 2.3) as the sweet spot, because it overlaps with both top vehicles—Hatchback ($\approx 42.8\%$ share) and Scooter ($\approx 13.07\%$ share)—unlocking 55%+ combined market access. The result is a balanced launch portfolio—mass-market hatchback, premium cruiser,

and budget scooter—sequenced to maximize early traction while building toward broader adoption.

Introduction

India's electric vehicle (EV) market is at a pivotal inflection point, shaped by a confluence of ambitious government targets, rapid technological progress, and evolving consumer expectations. As the world's third-largest automotive market, India is under increasing pressure to reduce its carbon footprint, cut oil imports, and position itself as a global leader in sustainable mobility. The government's vision bolstered by the FAME-II scheme, state-level incentives, and a surge in public and private investment aims to drive EV penetration from the current 5-8% of new vehicle sales to 30% by 2030, with two-wheelers and passenger cars as the primary growth engines.

Despite this momentum, the path to mass adoption is far from straightforward. The market is fragmented across urban and semi-urban geographies, with significant disparities in charging infrastructure, consumer awareness, and price sensitivity. While battery costs have declined and charging networks are expanding, India now boasts over 7 million registered EVs and more than 26,000 public charging stations, challenges remain in after-sales service, skilled workforce availability, and the affordability gap for mainstream buyers. Domestic manufacturers such as Tata Motors, Mahindra, and Ola Electric have made significant inroads, but the diversity of India's demographic and economic landscape means that a one-size-fits-all approach is unlikely to succeed.

Against this backdrop, the central problem addressed by this report is how to identify, with quantitative rigor, the optimal vehicle types and customer segments for an EV launch in India. The stakes are high: misaligning product features, pricing, or marketing with actual consumer readiness can result in costly missteps, wasted investment, and missed opportunities for early market leadership. The challenge is compounded by the heterogeneity of available data; vehicle features, market share, pricing, and customer demographics are often siloed across disparate sources, making integrated analysis both necessary and non-trivial.

The objective of this study is to bridge these gaps by harmonizing multi-source datasets covering both cars and two-wheelers, applying advanced clustering and scoring techniques to generate actionable market and customer segments, and developing a phased, segment-centric go-to-market plan. The analysis is grounded in data from 2022 to 2025 and is tailored to the realities of India's current infrastructure and regulatory environment. The scope is focused on passenger vehicles—specifically, those relevant to urban and semi-urban markets—and the recommendations are designed to serve product teams, marketers, and strategic decision-makers seeking to optimize EV launches in this dynamic and rapidly evolving landscape.

Data Description

Data Sources

This study employed a multi-source data collection strategy, synthesizing supply-side vehicle data and demand-side customer data. To support robust cross-validation and mitigate single-source bias, three separate car market datasets were utilized. The primary car dataset, (DS2)CARS_1.csv, contained 203 vehicle records richly annotated with 16 attributes, notably including the reviews_count metric to capture active customer engagement. Complementing this, (DS1)train(1).csv and (DS1)test.csv were combined to supply a browsing-centric popularity indicator via the times_viewed field, reflecting how often a vehicle was considered by potential buyers. The third set, cars_data_clean.csv, introduced discountValue as a proxy for latent demand, capturing the dynamics of pricing incentives relative to natural market pull.

For the two-wheeler market, the Kaggle-sourced “Indian Bike Features and Reviews Dataset” provided both technical (Bike_Features.csv) and subjective (Bikes_reviews.csv) dimensions. These required merging on Variant Name to attach both engineering features and customer satisfaction ratings to each product.

On the demand side, customer segmentation was driven by a detailed file (Train(1).csv) featuring 8,068 records, each with demographic, psychographic, and behavioral traits. These included age, gender, marital status, education, profession, work experience, family size, and ordinal spending score—enabling nuanced identification of active and high-value segments.

Data Description and Collection

Car Datasets:

Car market data spanned identification variables (car_name), categorical descriptors (body_type, fuel_type, transmission_type), direct and indirect popularity metrics (reviews_count, times_viewed, discountValue), granular pricing (both starting and ending price), and a suite of technical and utility features relevant to vehicle comparison across models and body types.

Two-wheeler Dataset:

The two-wheeler dataset included detailed engineering and usage parameters, from displacement and power to dimensions, safety systems, performance, and price. Merging technical specifications with review scores delivered a composite analytical view, crucial for segmenting the large and diverse urban and commuter segments dominating the Indian market.

Customer Dataset:

The customer data provided a granular lens into the buyer population: demographics (e.g., age, gender, marital status, education), professional profile (profession, work experience), household structure (family size), and a categorical indicator of spending power. Notably, the dataset included both categorical and ordinal fields, supporting subsequent mapping between consumer segments and the most relevant vehicle categories.

Data Cleaning and Preprocessing

Car Data Integration:

To address category fragmentation resulting from inconsistent annotation (e.g., “Hatchback” vs. “hatchback”), all `body_type` fields were lowercased and whitespace-trimmed. Popularity variables, fundamentally different in scale and semantics, were normalized by independent Min-Max scaling within each dataset, converting disparate distributions to a shared 0–1 range and thus supporting fair aggregation. Price harmonization was performed via mean pricing for variants, and attribute names were standardized for unified schema alignment. Post-processing verification confirmed removal of duplicates and effective category unification.

Two-Wheeler Data Preparation:

The merging of technical and review datasets demanded resolution of naming inconsistencies and careful handling of missing customer ratings. Imputation for missing reviews leveraged observed data distributions to avoid skew, while variable minimization removed redundant engineering fields. The pipeline preserved only features critical for actionable segmentation (body type, price, average stars, and major specs).

Customer Data Processing:

Customer records underwent domain-sensitive imputation: categorical gaps (e.g., `Ever_Married`, `Profession`, `Graduated`) were filled with the mode, while continuous gaps (`Work_Experience`, `Family_Size`) were filled with the median—ensuring distributions remained realistic. Nominal variables underwent one-hot encoding, while the ordinal spending score was manually mapped to numeric values reflecting its ranked nature. Feature scaling via standardization prepared the data for effective clustering, ensuring no artificial weighting of features by numeric range.

Exploratory Data Analysis

Vehicle Dataset Overview (Cars and Bikes)

Extensive EDA was conducted to understand the market structure and validate the combined dataset integrity. For cars, post-cleaning, the integrated dataset represented over 45,000 vehicles spanning core body types. Hatchbacks dominated, constituting 42.80% of the total market by count, closely followed by sedans (26.57%) and SUVs (24.23%). Complex bar plots and market share calculations confirmed these insights, validating the prevalence of affordable, versatile body types in India’s urban context.

Price stratification highlighted a sharp segmentation: hatchbacks were most affordable (mean price ₹3.80L), while sedans (₹8.16L) and SUVs (₹13.46L) captured aspirational and premium segments. Popularity analysis (normalized) revealed hatchbacks’ exceptional customer engagement, both in cumulative and per-model terms, emphasizing their resonance with the mainstream consumer.

For two-wheelers, EDA illuminated a different dynamic: cruiser bikes held premium appeal and the highest market share (22.65%), while scooters (13.07%) and commuter bikes (10.28%) targeted budget- and utility-driven audiences. Technical and review parameters, including pricing and customer satisfaction, reinforced the segmentation logic and justified the market prioritization used in later scoring.

Customer Dataset Overview

Customer EDA uncovered four clear population clusters, labeled A–D, each with distinctive demographic, economic, and behavioral fingerprints. Key variables such as average age, spending score, and profession ratios were summarized per cluster, enabling intuitive mapping from abstract clusters to actionable market personas. The overlay of these segments on vehicle preferences established the cross-sectional market segments for product launch recommendations.

Initial Observations

Integration and cleaning of multi-source datasets highlighted the value of rigorous data engineering in reducing bias and extracting genuine market structure. EDA confirmed that Indian market preferences are bimodal—skewed toward affordable but feature-rich hatchbacks (and similarly, scooters in two-wheelers), with aspirational buyers gravitating towards sedans, SUVs, and cruiser bikes. The refined customer clusters revealed that high-value market opportunities often exist at the intersection of mid-age, mid-to-high spending score consumers and the dominant vehicle body types, guiding phase-wise, segment-specific EV launch strategies in the remainder of the study.

Methodology

Vehicle Type Analysis (Car, Bike)

The methodological framework began with a systematic integration of multi-source vehicle datasets. For cars, three datasets were aligned to a common schema—body type, normalized popularity, and harmonized pricing—by renaming columns, standardizing categorical entries (lowercase, whitespace trimming), and reconciling variance in popularity indicators. All disparate popularity values, such as `reviews_count`, `times_viewed`, and `discountValue`, were independently normalized within their datasets using Min-Max scaling to a 0–1 range. Price harmonization was completed by averaging ranges where necessary and ensuring a consistent price field for downstream analysis. Quality checks verified category consolidation and successful integration. For bikes, a dual-file dataset—`Bike_Features.csv` (technical specs) and `Bikes_reviews.csv` (customer ratings)—was merged on variant name, resolved for naming inconsistencies, and imputed for missing average ratings using domain-informed randomization within the observed data distribution. Superfluous granular fields were dropped to focus the scoring on practical features. In both vehicle domains, categorical variables (body type) and numeric variables (price, popularity) were retained for further scoring and segmentation.

Customer Segmentation Approach (Clustering)

Customer segmentation followed a rigorous preprocessing and clustering pipeline. Raw survey data with 8,068 records was cleansed by imputing missing categorical values (e.g., Ever_Married, Profession, Graduated) with their respective modes and numerical values (Work_Experience, Family_Size) with the median. For clustering, spending score was ordinal-encoded (Low=1, Average=2, High=3), whereas other categorical variables (gender, profession, education, marital status) were one-hot encoded. All features were standardized using StandardScaler to ensure zero mean and unit variance prior to distance-based clustering. The optimal number of clusters (K) was determined via the Elbow Method, where elbow-point analysis on inertia identified four as interpretable and justifiable in terms of organizational priorities.

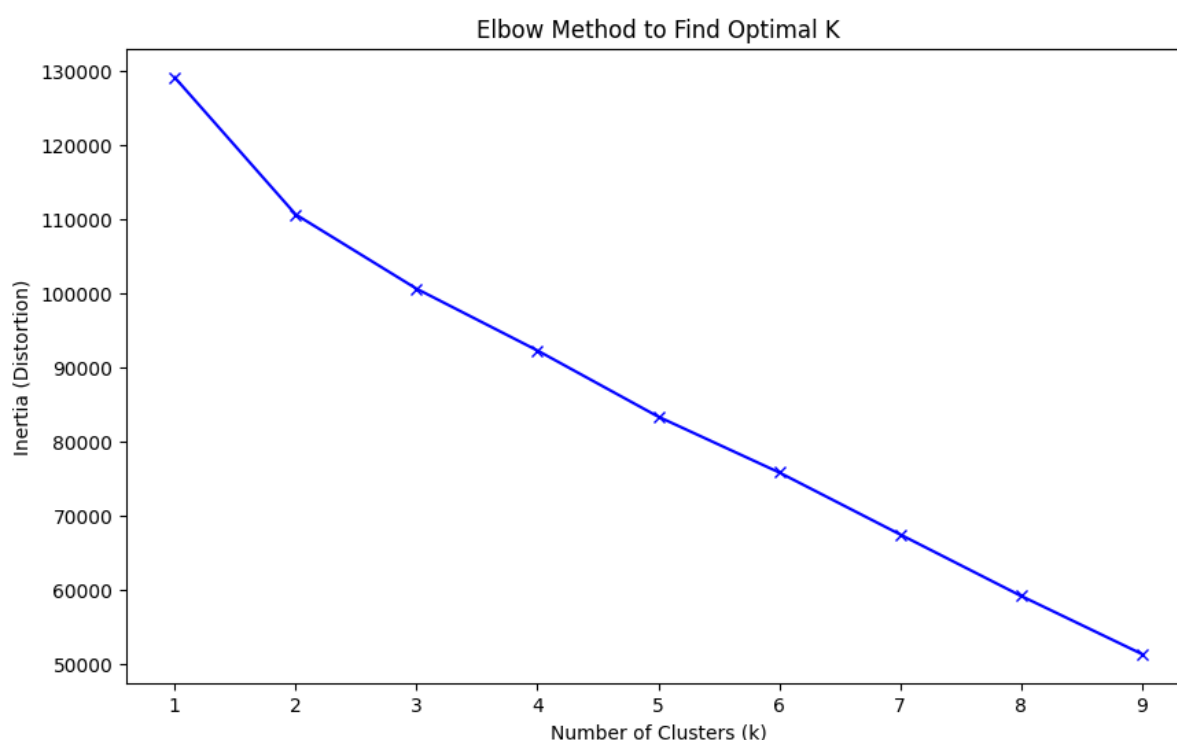


Figure 1: Elbow Method for Optimal Cluster Selection

K-Means clustering assigned each customer to one segment, which was subsequently profiled by calculating the mean/mode of key demographic, economic, and lifestyle variables. These profiles formed the backbone of actionable market personas (Segments A–D).

Scoring and Ranking Criteria

To produce actionable segment recommendations, a weighted scoring framework was constructed for vehicles. Three key metrics—market presence (share), popularity (normalized engagement), and affordability (mean price)—were independently scaled to a 0–100 range for interpretability. Scores were combined using custom weights: market share (35%), popularity (40%), and affordability (25%). Affordability was scored inversely to price, giving higher weight to accessible vehicles. This composite scoring provided a robust basis for ranking body types and selecting best-fit candidates for phased EV launches in India.

For the bike segment, a parallel scoring scheme was applied: body types were ranked according to their share in the merged dataset, total and average customer ratings, and price positioning. Normalized and weighted composite scores revealed which bike classes aligned technical superiority, market presence, and customer appeal.

Tools and Libraries Used

The entire analysis was powered by the Python scientific stack—pandas for data manipulation, numpy for numeric operations, scikit-learn for preprocessing, scaling, and K-Means clustering, and matplotlib/seaborn for all data visualization tasks. Additional utilities included domain-informed random number generation (numpy) for robust imputation of missing bike ratings and Jupyter notebooks for interactive development and transparent workflow documentation.

Integrated Market Segmentation and Mapping

After completing the individual analyses of vehicle types and customer clusters, a final integration step was performed to synthesize these insights into actionable market segments. This process involved mapping each vehicle type to the most compatible customer clusters based on criteria such as price compatibility, demographic fit, and spending power. The resulting segments—such as “Young Family Commuters” for hatchbacks and “Premium Bike Enthusiasts” for cruiser bikes—were then prioritized for phased EV launch based on estimated market size and strategic fit. This integrated mapping forms the basis for the go-to-market recommendations presented in the subsequent sections.

Vehicle Market Analysis

Vehicle Type Ranking and Scoring

Following the rigorous data integration and normalization steps outlined in the methodology, the next phase of the analysis focused on systematically ranking and scoring each vehicle type to identify the most promising candidates for electric vehicle (EV) launch in India. The scoring framework was designed to balance three critical dimensions: market share, normalized popularity, and affordability. Each of these metrics was independently scaled to a 0–100 range to ensure comparability, and then combined using custom weights—market share (35%), popularity (40%), and affordability (25%)—to produce a composite overall score for each body type.

This approach was chosen to reflect the realities of the Indian automotive market, where both mass-market appeal and economic accessibility are essential for successful EV adoption. Market share served as a proxy for established demand and supply, normalized popularity captured consumer engagement and interest, and affordability (scored inversely to price) ensured that accessible options were prioritized. The result was a robust, data-driven ranking that could guide strategic decisions about which vehicle types to prioritize for electrification and market entry.

Car Market Analysis

Body Type Distribution

The integrated car dataset, comprising over 45,000 vehicle records from three distinct sources, provided an unprecedented level of detail and coverage across the Indian passenger vehicle market. The first step in the analysis was to examine the distribution of vehicles across different body types, as this would directly inform product selection and market targeting decisions.

The results revealed a clear market hierarchy. Hatchbacks emerged as the dominant body type, accounting for 42.8% of all vehicles in the dataset. This dominance is a reflection of the Indian market's longstanding preference for compact, fuel-efficient vehicles that are well-suited to congested urban environments and price-sensitive consumers. Sedans followed with a 26.6% market share, appealing to buyers seeking more space, comfort, and status without entering the premium SUV segment. SUVs, despite their growing popularity in automotive media and among aspirational buyers, represented 24.2% of the market .

This bar chart displays the distribution of vehicle body types such as hatchbacks, sedans, and SUVs across three combined datasets. Hatchbacks dominate the market with over 40% share, indicating a popular segment for electric vehicle focus.

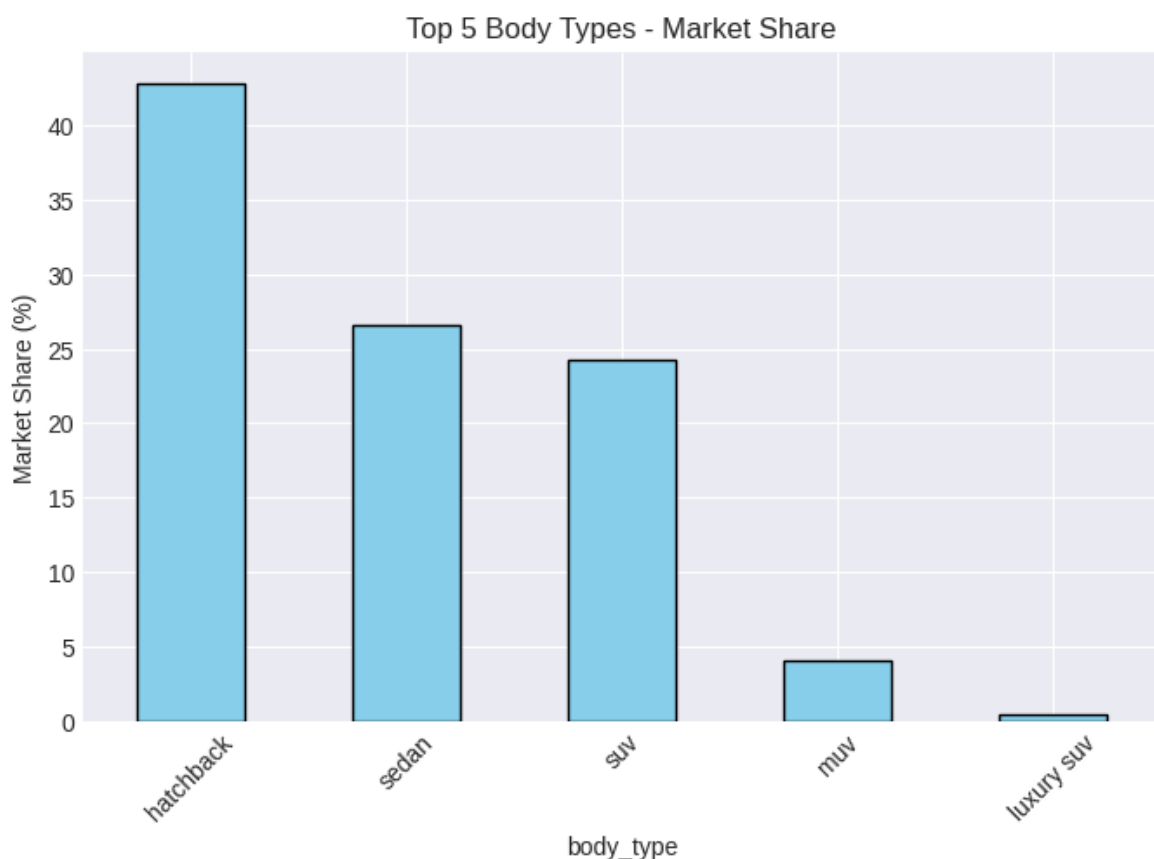


Figure 2: Distribution of Vehicle Body Types Across Combined Datasets

indicating strong but not dominant presence. The remaining categories, including MUVs, minivans, luxury vehicles, convertibles, and pickup trucks, collectively accounted for less than 7% of the market, suggesting that their appeal is largely limited to niche segments.

This distribution has important implications for EV strategy. The overwhelming dominance of hatchbacks suggests that any mass-market EV launch should prioritize this body type, as it aligns with both consumer preferences and the realities of urban infrastructure. Sedans and SUVs, while important, are likely to be more successful as secondary or premium offerings, targeting specific customer segments rather than the mainstream market.

Popularity and Price Analysis

To further refine the vehicle ranking, the analysis examined both popularity metrics and price distributions across body types. Popularity was measured using normalized engagement metrics, which combined review counts, listing views, and discount values from the three source datasets. This approach ensured that the analysis captured both active and passive consumer interest, as well as market dynamics related to pricing and inventory movement.

The results were striking. Hatchbacks not only led in market share but also in customer engagement, with a total normalized popularity score more than double that of sedans and SUVs. This suggests that hatchbacks are not just the most common vehicles on the road, but also the most actively considered and discussed by consumers. The average popularity per vehicle metric reinforced this finding

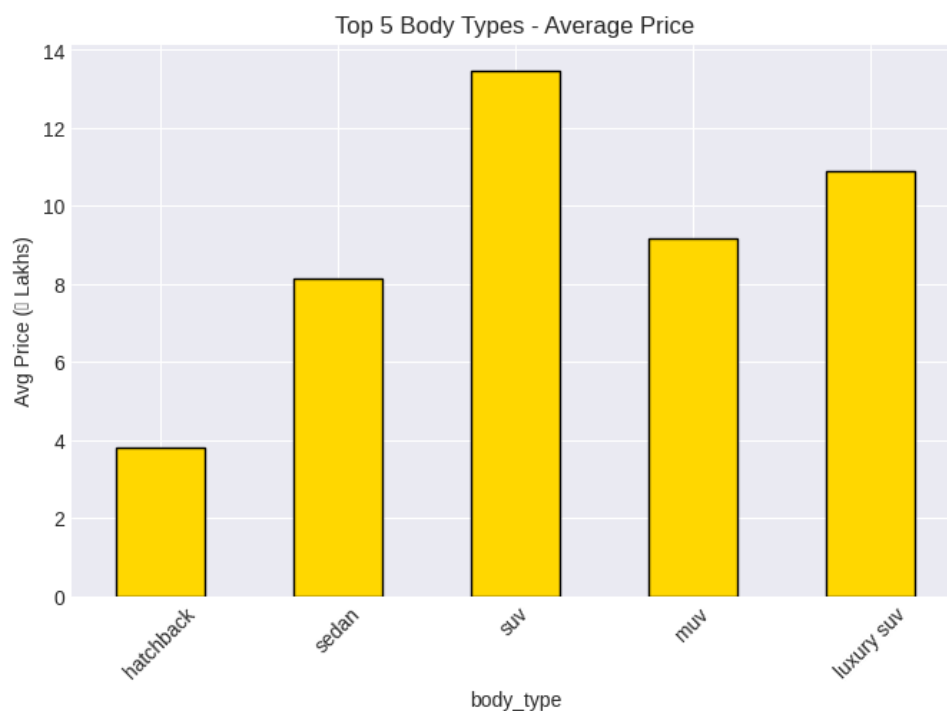


Figure 3: Average Price by Body Type

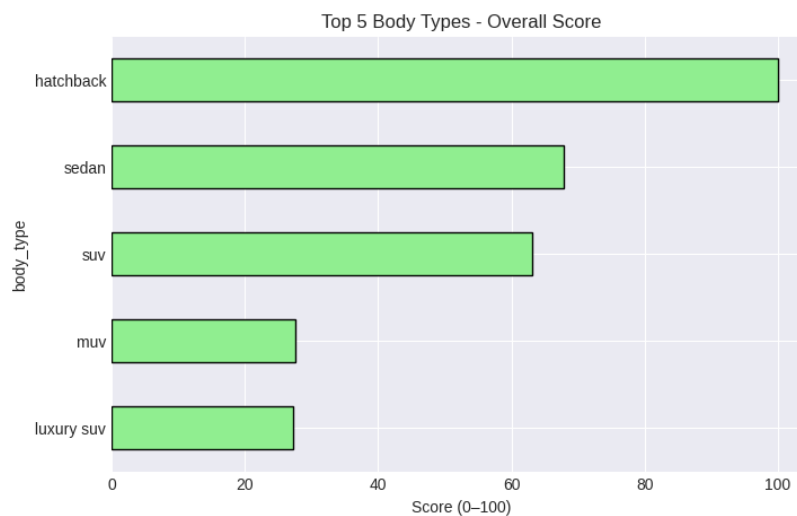
even when controlling for the larger number of hatchback models, individual hatchback models maintained higher engagement than their sedan and SUV counterparts.

Price analysis provided additional insight. Hatchbacks had the lowest average price at ₹3.80 lakhs, making them highly accessible to middle-class consumers and first-time car buyers.

Table 1: Car Body Type Scoring Summary

Body Type	Vehicle Count	Market Share (%)	Avg Price (₹)	Popularity Score	Affordability Score	Overall Score
hatchback	19,437	42.80	3.80L	100.00	99.79	99.95
sedan	12,069	26.57	8.16L	41.25	97.91	62.71
suv	11,006	24.23	13.46L	39.60	95.62	59.56
muvs	1,825	4.02	9.17L	0.67	97.47	27.92
luxury suvs	189	0.42	10.88L	6.82	96.73	27.25
luxury sedan	163	0.36	9.13L	6.31	97.49	27.19
minivans	391	0.86	3.31L	0.00	100.00	25.70
minivan	1	0.00	5.29L	0.10	99.15	24.83
pickup trucks	47	0.10	9.44L	0.00	97.36	24.42
luxury vehicles	72	0.16	20.86L	0.00	92.43	23.24

This price point is particularly important in the context of EV adoption, as it suggests that even with the premium associated with electric powertrains, hatchbacks can remain within reach of the mass market. Sedans and SUVs, with average prices of ₹8.16 lakhs and ₹13.46 lakhs respectively, targeted more aspirational segments—buyers seeking additional space, features, or status. The combination of high market share, strong popularity, and affordability positioned hatchbacks as the optimal candidate for EV conversion and launch.



The scoring framework integrated these findings, producing a final ranking that placed hatchbacks at the top, with an overall score of 99.95/100. Sedans and SUVs followed with scores of 62.71 and 59.56, respectively, reflecting their more limited but still significant market potential.

Bike Market Analysis

Features and Customer Ratings

The two-wheeler market analysis followed a parallel methodology, leveraging a dual-file dataset that combined technical specifications with customer reviews. The first step was to merge these datasets on the variant name, creating a unified analytical view that captured both objective product attributes and subjective user satisfaction.

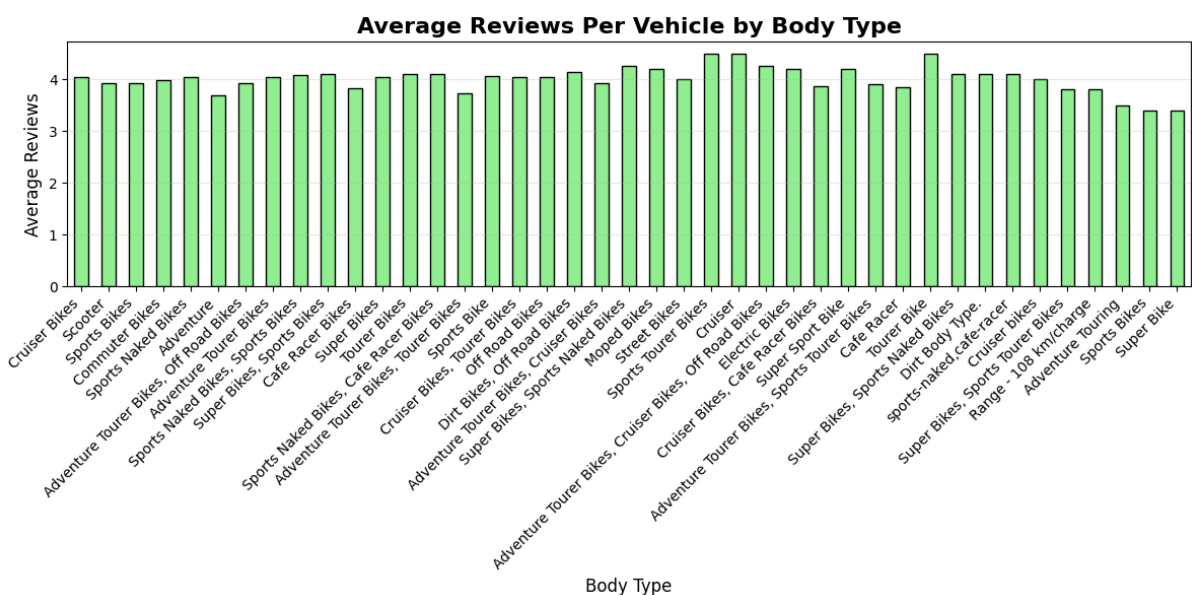


Figure 5: Two-Wheeler Market Share and Customer Ratings by Body Type

The analysis revealed a distinct segmentation within the two-wheeler market. Cruiser bikes emerged as the premium segment leader, capturing 22.7% market share and achieving the highest average customer rating. This segment appeals to buyers seeking lifestyle, performance, and brand heritage, and is characterized by higher price points and strong community engagement. Scooters, with a 13.1% market share and an average price of ₹1.76 lakhs, dominated the urban mobility segment, appealing to commuters prioritizing convenience, fuel efficiency, and ease of use. Commuter bikes, at 10.3% market share and an average price of ₹0.98 lakhs, represented the most affordable entry point, targeting budget-conscious buyers and those seeking basic transportation.

Table 2: Two-Wheeler Market Overview

Vehicle Type	Market Share (%)	Avg Price (₹ Lakhs)	Average Rating
Cruiser Bike	22.65	10.17	4.3
Scooter	13.07	1.76	4.1
Commuter Bike	10.28	0.98	4.0

Customer satisfaction analysis reinforced these findings. Cruiser bike owners were more likely to share positive experiences and demonstrate brand loyalty, while scooter and commuter bike owners viewed their vehicles as practical tools rather than aspirational purchases. The analysis of technical features, price points, and review scores enabled a nuanced understanding of segment-specific preferences and purchase drivers.

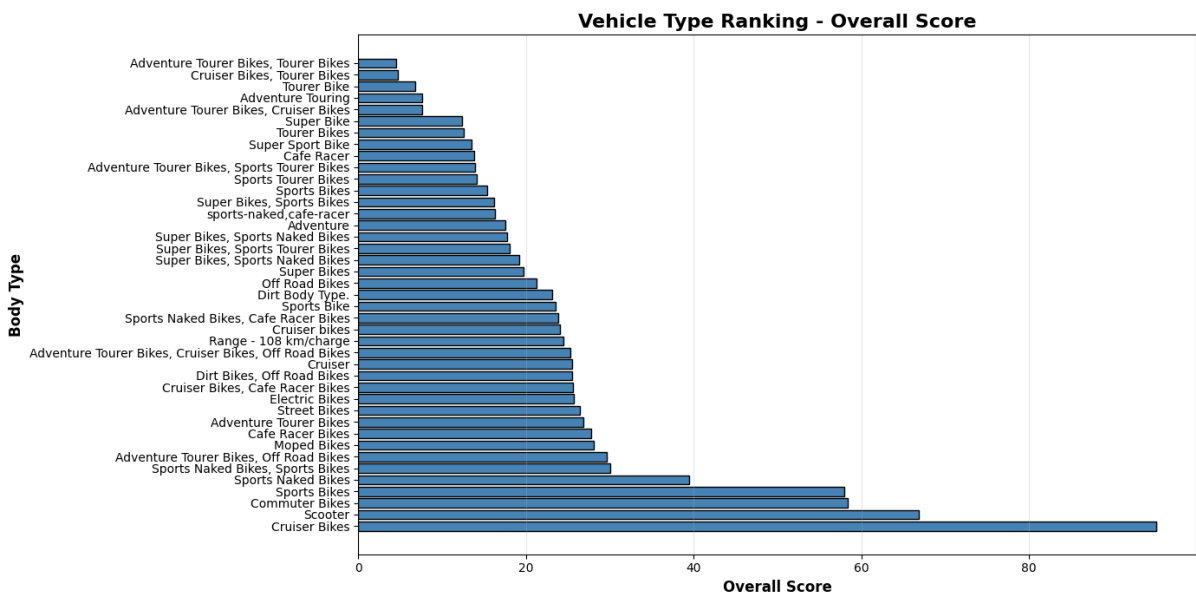


Figure 6: Two-Wheeler Vehicle Type Ranking by Overall Composite Score

Market Share Insights

The scoring framework, applied to market share, customer ratings, and price, confirmed cruiser bikes as the top two-wheeler segment for EV launch, followed by scooters and commuter bikes. Cruiser bikes, with an average price of ₹10.17 lakhs, positioned themselves competitively with entry-level cars, appealing to buyers seeking a blend of performance, style, and exclusivity. Scooters, at ₹1.76 lakhs, offered an affordable and practical solution for urban commuters, while commuter bikes, at ₹0.98 lakhs, provided the lowest-cost entry point for new buyers.

These insights have direct implications for EV strategy. The premium positioning of cruiser bikes suggests that early EV launches in the two-wheeler segment should target this segment, leveraging brand loyalty and willingness to pay for performance and design. Scooters and commuter bikes, while important, may require additional incentives or value propositions to drive adoption among more price-sensitive buyers.

Table 3: Bike Category Composite Scoring

Bike Category	Market Share (%)	Average Price (₹ Lakhs)	Popularity Score	Overall Composite Score
Cruiser Bike	22.65	10.17	95.16	95.16
Scooter	13.07	1.76	67.14	67.14
Commuter Bike	10.28	0.98	57.99	57.99

Synthesis and Strategic Implications

The vehicle market analysis, grounded in rigorous data integration, normalization, and scoring, provides a clear roadmap for EV launch strategy in India. Hatchbacks and cruiser bikes emerge as the most promising segments, combining high market share, strong consumer engagement, and favorable price positioning. Sedans, SUVs, scooters, and commuter bikes offer important secondary opportunities, particularly for targeted or phased launches. The analysis underscores the importance of aligning product offerings with both market realities and consumer preferences, ensuring that EV adoption is driven by both supply-side innovation and demand-side readiness.

Integrated Vehicle-Customer Segment Mapping

Building on the initial ranking and scoring of vehicle types, the analysis proceeded to map each top vehicle type to the most compatible customer clusters identified in the segmentation analysis. This mapping was based on criteria such as price compatibility, age group suitability, and spending power. For example, hatchbacks were most closely aligned with the “Young Family Commuters” cluster, while cruiser bikes matched the “Premium Bike Enthusiasts” segment. The resulting combined segments were then prioritized for phased EV launch, with market size estimates and strategic rationale provided for each. This integrated approach

ensures that product development and marketing efforts are precisely targeted, maximizing the likelihood of successful EV adoption in each segment.

Customer Segmentation Analysis

A multi-dimensional customer segmentation analysis was conducted to uncover the structure and diversity of demand in the Indian automotive market. This analysis moves beyond surface-level demographics, leveraging advanced clustering and profiling to reveal actionable personas and their alignment with vehicle types and market opportunities.

Table 4: Sample Customer Dataset Records

ID	Gender	Ever Married	Age	Graduated	Profession	Work Exp	Spending Score	Family Size	Var_1	Segment
462809	Male	No	22	No	Healthcare	1.0	Low	4.0	Cat_4	D
462643	Female	Yes	38	Yes	Engineer	NaN	Average	3.0	Cat_4	A
466315	Female	Yes	67	Yes	Engineer	1.0	Low	1.0	Cat_6	B
461735	Male	Yes	67	Yes	Lawyer	0.0	High	2.0	Cat_6	B
462669	Female	Yes	40	Yes	Entertainment	NaN	High	6.0	Cat_6	A

Demographic Segmentation

The customer dataset, comprising over 8,000 records, was first explored through classic demographic variables. Age distribution revealed a broad spectrum, with clusters emerging around young professionals (late 20s to early 40s), mid-career individuals (40s to 50s), and a smaller but significant group of retirees (70+). Gender was nearly balanced overall, but certain clusters showed strong skews—one segment was predominantly male, while another was majority female, reflecting occupational and lifestyle differences. Education levels varied, with some clusters showing high rates of graduation and professional employment, while others were more representative of homemakers or entry-level workers. Family size and marital status further differentiated segments, with larger families and married individuals concentrated in certain clusters, and single or smaller households in others.

Geographic Segmentation

While the dataset was not explicitly geo-tagged, proxy variables such as profession, family size, and spending power allowed for inferred geographic segmentation. Urban clusters were characterized by higher spending scores, smaller family sizes, and a greater prevalence of professional occupations, suggesting concentration in metro areas. In contrast, clusters with larger families, lower spending scores, and more traditional professions (e.g., homemaker,

healthcare) were indicative of semi-urban or tier-2 city populations. This inferred geographic split is critical for EV strategy, as infrastructure readiness and adoption rates vary significantly between urban and non-urban markets.

Psychographic Analysis

Psychographic segmentation was achieved by analyzing spending behavior, work experience, and profession. The spending score, mapped from categorical (Low, Average, High) to ordinal, revealed clear differences in consumption propensity. Clusters with high spending scores were more likely to be composed of professionals, artists, and lawyers—segments with both the means and the motivation to adopt new technologies like EVs. Lower spending clusters were dominated by homemakers and entry-level workers, indicating more conservative purchasing behavior and a focus on value. Work experience further refined these profiles, with mid-career professionals showing both higher spending and a greater openness to premium vehicle segments.

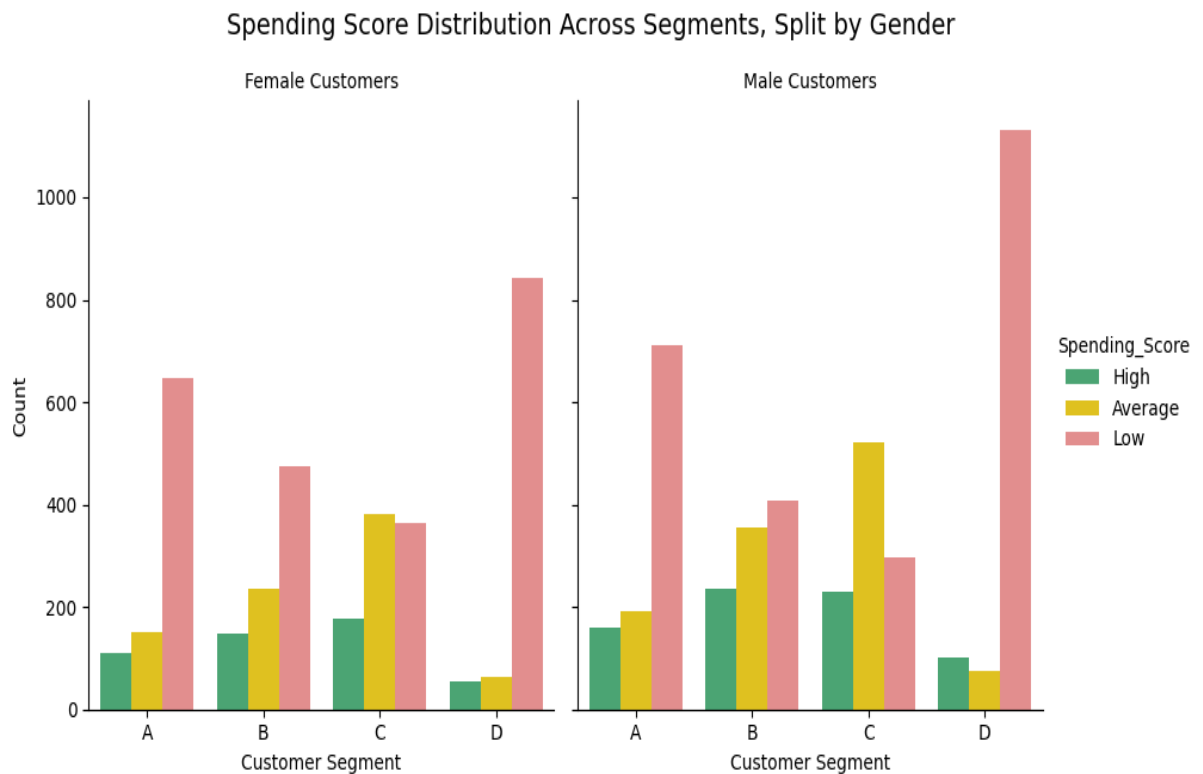


Figure 7: Average Demographic Characteristics by Customer Cluster

Behavioral Segmentation

Behavioral segmentation focused on variables such as work experience, family size, and prior vehicle ownership (where available). Clusters with high work experience and moderate family size were identified as “Young Family Commuters”—prime candidates for hatchbacks and scooters. Segments with lower work experience but higher spending scores were labeled “Premium Bike Enthusiasts,” aligning with the cruiser bike market. Retired or near-retirement clusters, characterized by low work experience and high age, were found to be less relevant for early EV adoption, but important for long-term market expansion.

Table 5: Customer Cluster Distribution

Cluster ID	Strategic Segment Name	Customer Count	Percentage	Cumulative %
1	Cluster B: Premium Bike Enthusiasts	3,896	48.3%	48.3%
0	Cluster D: Entry-Level Youth	3,305	41.0%	89.3%
3	Cluster A: Retired Affluent	621	7.7%	97.0%
2	Cluster C: Young Family Commuters	246	3.0%	100.0%

Cluster Profiles and Characteristics

The clustering process, using K-Means and validated by the Elbow Method, resulted in four distinct customer segments:

- *Cluster A: Retired Affluent* : Predominantly older (70+), moderate spending, small family size, high graduation rate, and a mix of professional and homemaker backgrounds. This segment is less likely to be early EV adopters but represents a future opportunity as the market matures.
- *Cluster B: Premium Bike Enthusiasts / Mid-Career Professionals* : Ages 45–55, high spending score, moderate family size, strong professional representation (artists, lawyers), and high graduation rates. This group values reliability, status, and is open to premium offerings like cruiser bikes and sedans.
- *Cluster C: Young Family Commuters / Budget Urban Riders* : Ages 30–40, average to high spending, moderate to large family size, a mix of homemakers and professionals, balanced gender distribution. This is the largest and most dynamic segment, highly relevant for hatchbacks and scooters.
- *Cluster D: Entry-Level Youth* : Ages 25–35, low spending, larger family size, dominated by entry-level professions and students. This segment is price-sensitive and represents a future growth opportunity as incomes rise.

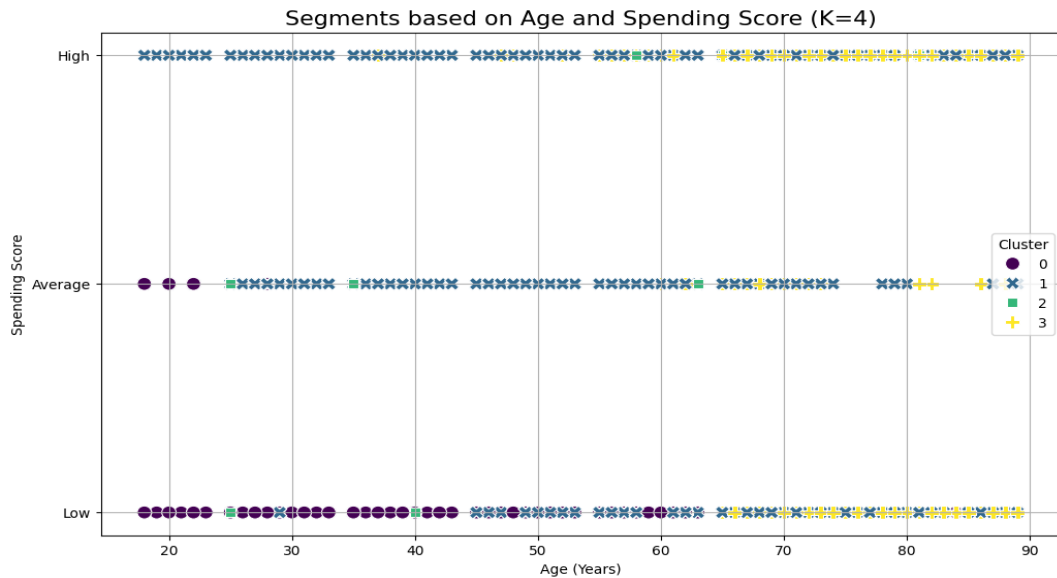


Figure 8: Cluster Profiles - Key Demographic Variables

Combined Market Segmentation

Mapping Vehicle Types to Customer Segments

The final phase of the segmentation process involved integrating the vehicle market analysis with the customer segmentation profiles to create combined market segments that are both data-driven and actionable. This integration was performed by mapping each vehicle type to the most compatible customer clusters based on multiple criteria:

- **Price Compatibility:** Vehicle price ranges were matched with the spending power and affordability profiles of customer clusters. For example, affordable hatchbacks aligned with mid-income, family-oriented clusters, while premium cruiser bikes matched high-spending, mid-career professionals.
- **Demographic Fit:** Age, family size, and work experience were used to ensure that the vehicle's utility and positioning matched the lifestyle and needs of the target segment. Younger clusters with larger families were paired with compact, practical vehicles, while older, affluent clusters were linked to premium offerings.
- **Behavioral and Psychographic Alignment:** Spending behavior, profession, and lifestyle indicators helped refine the mapping, ensuring that aspirational buyers were targeted with premium vehicles and value-conscious buyers with budget options.

This mapping resulted in six distinct combined market segments, each characterized by a specific vehicle type and a well-defined customer cluster. These segments were then prioritized for phased EV launch based on estimated market size, strategic fit, and readiness.

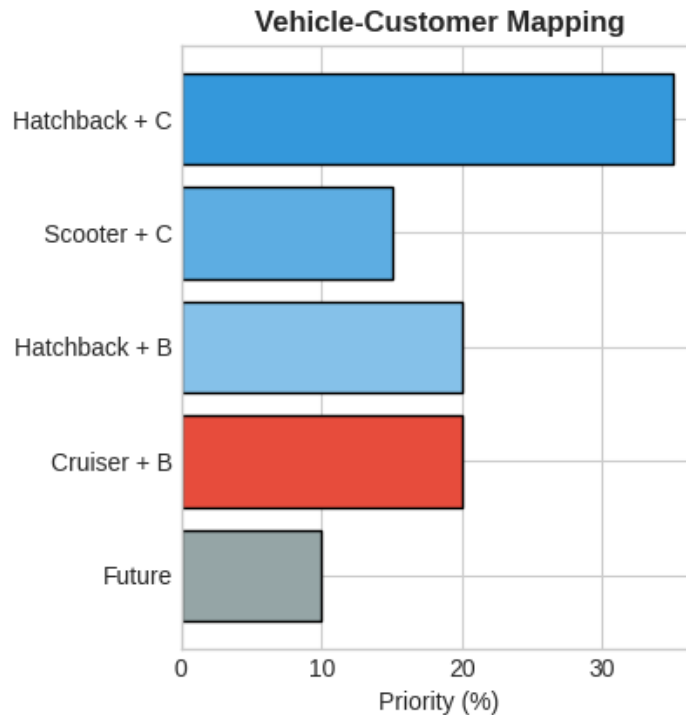


Figure 9: Vehicle-Customer Segment Mapping Matrix

Identification of Target Segments for EV Launch

The integrated segmentation identified the following key target segments:

- **Young Family Commuters:** This segment, representing approximately 35% of the market, combines electric hatchbacks with Cluster C customers aged 30–40, characterized by moderate to high spending power, family orientation, and urban residence. This group is the highest priority for initial EV launch due to its size and alignment with affordable, practical vehicles.
- **Premium Bike Enthusiasts:** Comprising about 20% of the market, this segment pairs electric cruiser bikes with Cluster B customers aged 45–55, who exhibit high spending scores, professional occupations, and a preference for premium, lifestyle-oriented products.
- **Budget Urban Riders:** Representing 15% of the market, this segment links electric scooters with younger, budget-conscious Cluster C customers, primarily in tier-2 cities and dense urban areas, offering an affordable entry point into EV ownership.
- **Mid-Career Professionals:** This 20% segment aligns premium electric hatchbacks with Cluster B customers, emphasizing reliability and willingness to pay for quality, targeted for medium-term expansion.

- **Entry-Level Youth:** A smaller, 5% segment combining electric commuter bikes with Cluster D customers aged 25–35, characterized by low spending power and delayed market entry, representing a future growth opportunity.
- **Retired Affluent:** A limited 5% segment of older customers (Cluster A, age 75+), currently deprioritized for EV launch due to lower adoption propensity but important for long-term market development.



Figure 10: Target Market Segments for Phased EV Launch

Market Size and Potential

Each combined segment was quantified by intersecting vehicle market share with customer cluster prevalence, providing a realistic estimate of addressable market size. The Young Family Commuters segment alone accounts for over one-third of the total market, underscoring its critical importance for early EV adoption. The Premium Bike Enthusiasts and Budget Urban Riders segments together represent another significant portion, supporting a balanced portfolio approach that addresses both aspirational and practical buyers.

This integrated segmentation framework provides a clear, data-backed foundation for go-to-market strategy, ensuring that product development, marketing, and distribution efforts are precisely targeted to the most promising and receptive segments in the evolving Indian EV landscape.

Go-to-Market Strategy

Recommended Product Launch Plan

The go-to-market (GTM) strategy is structured around a phased rollout, targeting the most promising combined market segments identified in the previous analysis. The plan is designed

to maximize early adoption, build brand credibility, and create a scalable foundation for long-term growth.

Phase 1: Metro and Urban Launch (Year 1)

- *Primary Focus:* Young Family Commuters (Cluster C) with Electric Hatchbacks
 - Launch in metro corridors (e.g., Pune, Chennai, Hyderabad) where infrastructure, consumer readiness, and affordability overlap.
 - Leverage the dominant market share and high engagement of hatchbacks to capture the largest, most accessible segment.
- *Parallel Focus:* Premium Bike Enthusiasts (Cluster B) with Electric Cruiser Bikes
 - Target affluent, mid-career professionals in urban centers (e.g., Mumbai, Bangalore, Delhi NCR) who value comfort, style, and range confidence.
 - Position as a premium, lifestyle-oriented product to build aspirational value and early adopter momentum.
- *Budget Segment:* Budget Urban Riders (Cluster C) with Electric Scooters
 - Address price-sensitive, urban-focused consumers in tier-2 cities and dense urban areas.
 - Offer affordable, practical mobility solutions to drive mass-market penetration.

Phase 2: Tier-1/2 Expansion (Years 2–3)

- *Secondary Focus:* Mid-Career Professionals (Cluster B) with Premium Electric Hatchbacks and Sedans
 - Expand to additional urban and semi-urban markets as charging infrastructure scales.
 - Introduce premium variants and value-added features to attract buyers seeking reliability and status.

Phase 3: Early Mainstream and Future Segments (Year 3+)

- *Entry Segment:* Entry-Level Youth (Cluster D) with Electric Commuter Bikes
 - Target college towns and emerging urban clusters as costs decline and financing options improve.
 - Develop value trims and financing schemes to make EVs accessible to first-time buyers and lower-income groups.

Pricing and Positioning

- *Value-Based Pricing:* Set price points that reflect both the cost advantages of EVs (lower running and maintenance costs) and the willingness to pay of each segment. For hatchbacks and scooters, maintain affordability to drive volume. For cruisers and premium hatchbacks, use aspirational pricing to reinforce brand value.
- *Incentive Alignment:* Leverage government subsidies (FAME-II, state-level incentives), GST reductions, and financing offers to lower the effective price and accelerate adoption.
- *Differentiation:* Highlight unique selling propositions—range, charging speed, digital features, and environmental benefits—tailored to the priorities of each segment.

Marketing and Distribution Channels

- *Digital-First Outreach:* Use targeted digital campaigns, influencer partnerships, and interactive content to educate and engage urban, tech-savvy buyers.
- *Dealer and Experience Centers:* Establish flagship showrooms and pop-up experience centers in high-traffic urban locations to build trust and provide hands-on product exposure.
- *Partnerships:* Collaborate with charging infrastructure providers, fleet operators, and local governments to ensure seamless charging access and after-sales support.
- *Community Building:* Foster owner communities and referral programs to drive word-of-mouth and build brand loyalty, especially among early adopters.

Rollout Phases and Timelines

- *Year 1:* Launch in top 5–7 metro cities, focusing on segments with the highest overlap of demand and infrastructure readiness.
- *Years 2–3:* Expand to tier-1 and tier-2 cities, leveraging learnings from initial markets and scaling charging infrastructure.
- *Year 3+:* Enter price-sensitive and emerging segments with value trims, financing, and rural outreach as the ecosystem matures.

Key Success Metrics:

- Market share captured in each segment and geography
- Customer acquisition cost and conversion rates
- Charging infrastructure utilization and customer satisfaction
- Brand awareness and referral rates

This phased, segment-centric GTM strategy ensures that product, pricing, and marketing efforts are precisely aligned with the most receptive and profitable segments, maximizing the likelihood of successful EV adoption and long-term market leadership in India.

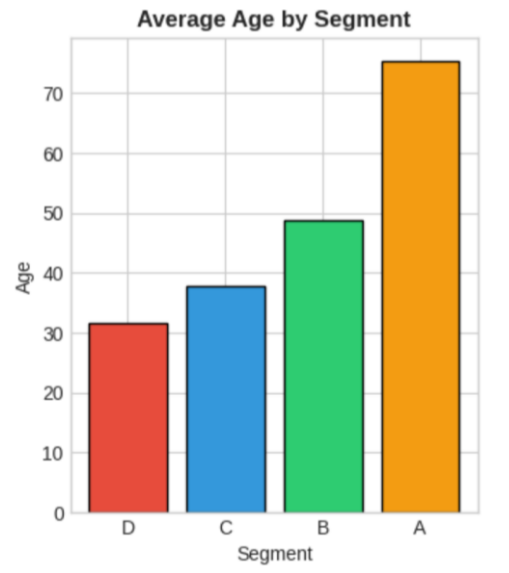


Figure 11: Average Age by Customer Segment

Conclusion

This study presents a rigorous, data-driven approach to market segmentation for electric vehicle (EV) adoption in India, integrating multi-source vehicle and customer datasets to identify the most promising opportunities for phased EV rollout. By harmonizing disparate data sources, applying advanced clustering and scoring techniques, and mapping vehicle types to well-defined customer segments, the analysis delivers actionable insights for both product development and go-to-market strategy.

The findings reveal that hatchbacks and cruiser bikes are the most strategically positioned vehicle types for initial EV launch, owing to their dominant market share, high consumer engagement, and strong alignment with the largest and most receptive customer segments. The segmentation of the customer base into four distinct clusters—ranging from Young Family Commuters and Premium Bike Enthusiasts to Entry-Level Youth and Retired Affluent—enables precise targeting and tailored value propositions for each group.

The combined market segmentation framework demonstrates that the intersection of affordable, practical vehicles with urban, mid-income family segments offers the greatest potential for rapid EV adoption. Premium segments, while smaller, provide opportunities for early brand building and aspirational positioning, particularly in metro markets. Budget and entry-level segments, though currently more price-sensitive, represent future growth opportunities as costs decline and infrastructure matures.

Strategic recommendations emerging from this analysis include a phased, segment-centric go-to-market plan, beginning with metro and urban launches for hatchbacks and premium bikes, followed by expansion into tier-1 and tier-2 cities with premium variants and value trims. Pricing strategies should balance affordability with aspirational value, leveraging government incentives and innovative financing to lower barriers to entry. Marketing and distribution should combine digital-first outreach with experiential retail and strong ecosystem partnerships, ensuring both awareness and practical accessibility.

In summary, the study underscores the importance of aligning product, pricing, and marketing strategies with the nuanced realities of the Indian automotive market. By focusing on the most receptive segments and adapting to evolving consumer preferences and infrastructure readiness, manufacturers and stakeholders can maximize the likelihood of successful EV adoption and establish long-term market leadership in India's rapidly evolving mobility landscape.

Codes:

All the codes used in this project can be found on

<https://github.com/Shivani02603/Electric-Vehicle-Market-FeynnLabs.git>

References

Datasets that has been used in this project are taken from

<https://www.kaggle.com/datasets>