**Findings from the Analysis**

**Data Cleaning and Standardization Summary**

1. **Resale Price Standardization**
   * Removed special characters (₹, commas, spaces).
   * Converted “Lakh” and “Crore” values to numeric (×100,000 and ×10,000,000).
   * Changed data type to **INTEGER**.
2. **Registered Year Normalization**
   * Extracted valid 4-digit years; invalid entries set to NULL.
   * Converted to **INTEGER**.
3. **Engine Capacity Cleanup**
   * Renamed to engine\_capacity\_cc.
   * Removed “cc” suffix and blanks; converted to **INTEGER**.
4. **Kilometers Driven Cleaning**
   * Removed “Kms” text, commas, and spaces.
   * Replaced blanks with NULL; converted to **INTEGER**.
5. **Max Power and Power Unit Standardization**
   * Extracted numeric values and separated power units (BHP / PS).
   * Converted PS to BHP (1 PS = 0.9863 BHP).
   * Stored as **DECIMAL(10,2)**.
6. **Seats Column Cleanup**
   * Replaced blanks with NULL.
   * Converted to **TINYINT**.
7. **Mileage Cleanup**
   * Removed “kmpl” and “km/kg” suffixes.
   * Replaced blanks with NULL; stored as **DECIMAL(5,2)**.
8. **Model Name Splitting**
   * Split model\_name into brand\_name and variant\_name.
   * Dropped original model\_name column.
9. **Handling Empty Strings**
   * Replaced blanks with NULL in all categorical columns (brand\_name, variant\_name, transmission\_type, owner\_type, fuel\_type, body\_type, city, insurance).
10. **Insurance Cleanup**
    * Replaced placeholders (“1”, “2”, blanks) with NULL.
11. **Brand Name Standardization**
    * Unified naming inconsistencies (e.g., *Maruti → Maruti Suzuki*, *Land → Land Rover*).
12. **Validation Checks**
    * Verified NULL counts and data types.
    * Ensured accurate value ranges post-cleaning.

Total null rows dropped: **~5.5%**  
 Time period covered: **2002–2023**  
 Brands analyzed: **33 prominent car manufacturers**

**Key Findings from EDA**

1. **Top Car Brands (2002–2023)**
   * **Maruti Suzuki** dominates with ~29% market share.
   * Followed by **Hyundai (~21%)** and **Honda (~11%)**.
2. **Pricing Insight**
   * Average resale price for **Maruti Suzuki** and **Hyundai** is just above ₹5 lakh — the “sweet spot” for affordability.
3. **Entry-Level Dominance**
   * **Maruti Suzuki** leads the entry-level segment with the highest sales volume.
4. **Luxury Segment**
   * **Land Rover** has the highest resale value, followed by **BMW**, **Volvo**, and **Mercedes-Benz**.
5. **Low Resale Value Brands**
   * **Chevrolet**, **Fiat**, and **Datsun** have the lowest resale values — likely due to discontinued operations or limited spare parts availability *(to verify)*.
6. **Ownership Impact on Price**
   * 2nd owner: ↓19% resale value
   * 3rd owner: ↓41.6%
   * 4th owner: ↓60% and continues to drop.
7. **Mileage vs Price Relationship**

| **Mileage Range** | **Average Resale Price (₹)** |
| --- | --- |
| 0–20k km | 1,452,344 |
| 20k–50k km | 1,019,589 |
| 50k–100k km | 736,499 |
| 100k+ km | 586,312 |

1. ➤ Indicates a **negative correlation** — lower kilometers yield higher resale prices.
2. **Fuel Type Trends**
   * **Diesel cars** show higher resale value, indicating stronger demand possibly due to fuel efficiency and running cost.
3. **City-Wise Price Comparison**
   * **Mumbai**: Highest resale prices.
   * Followed by **Delhi** and **Chennai**.

**Summary & Recommendations**

* **Best Market for Dealerships:**  
  Delhi shows the highest potential for used car sales, especially in the **mid-range segment (₹15–30 lakhs)**.
* **Ideal Inventory Mix:**  
  Focus on **4–8-year-old cars**, primarily **Maruti Suzuki** and **Hyundai** models such as *Baleno, Swift, Swift Dzire, Wagon R, and Grand i10*.
* **Fuel and Transmission Focus:**  
  Prioritize **petrol** and **manual** cars — these make up the majority of consumer demand.
* **Luxury Segment Opportunity:**  
  For premium dealerships, **Delhi** and **Mumbai** show strong demand for **BMW, Mercedes-Benz, and Land Rover** vehicles.

**Conclusion:**  
The Indian used car market is heavily brand-loyal and value-driven.  
A successful dealership strategy should balance **mid-range affordability** with **brand trust (Maruti Suzuki, Hyundai)**, while selectively targeting **luxury segments** in metro cities like Delhi and Mumbai.