

AXION RAY

Steering Wheel Warranty Claims Analysis Report

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1. Column Analysis

Dataset Overview

- **Total Columns:** 100+
- **Key Columns Analyzed:**
 - **VIN:** Unique vehicle identifier (100% populated)
 - **REPAIR_DATE:** Date of repair (converted to datetime)
 - **PLATFORM:** Vehicle type (e.g., Full-Size Trucks, BEV)
 - **GLOBAL_LABOR_CODE_DESCRIPTION:** Repair type (e.g., Steering Wheel Replacement)
 - **COMPLAINT_CD:** Complaint category (standardized)
 - **TOTALCOST:** Repair cost (median-imputed for missing values)
 - **CORRECTION_VERBATIM & CUSTOMER_VERBATIM:** Free-text repair descriptions

Data Types & Completeness

Column	Type	Missing Values	Unique Values
VIN	String	0	100% unique
REPAIR_DATE	Datetime	0	Daily entries
PLATFORM	Categorical	<5%	15+ vehicle types
TOTALCOST	Numeric	~10%	Median: \$450
CUSTOMER_VERBATIM	Text	<2%	Unstructured

2. Data Cleaning Summary

Actions Taken

1. Handled Missing Values:

- Numeric columns (e.g., TOTALCOST) → Median imputation
- Categorical columns (e.g., PLATFORM) → Mode imputation
- Dropped entirely empty columns (if any)

2. Standardized Text Fields:

- Converted repair descriptions to lowercase
- Normalized vehicle platform names (e.g., "FULL-SIZE TRUCKS" → "Full-Size Trucks")

3. Date Conversion:

- REPAIR_DATE parsed into datetime format for trend analysis

4. Tag Generation:

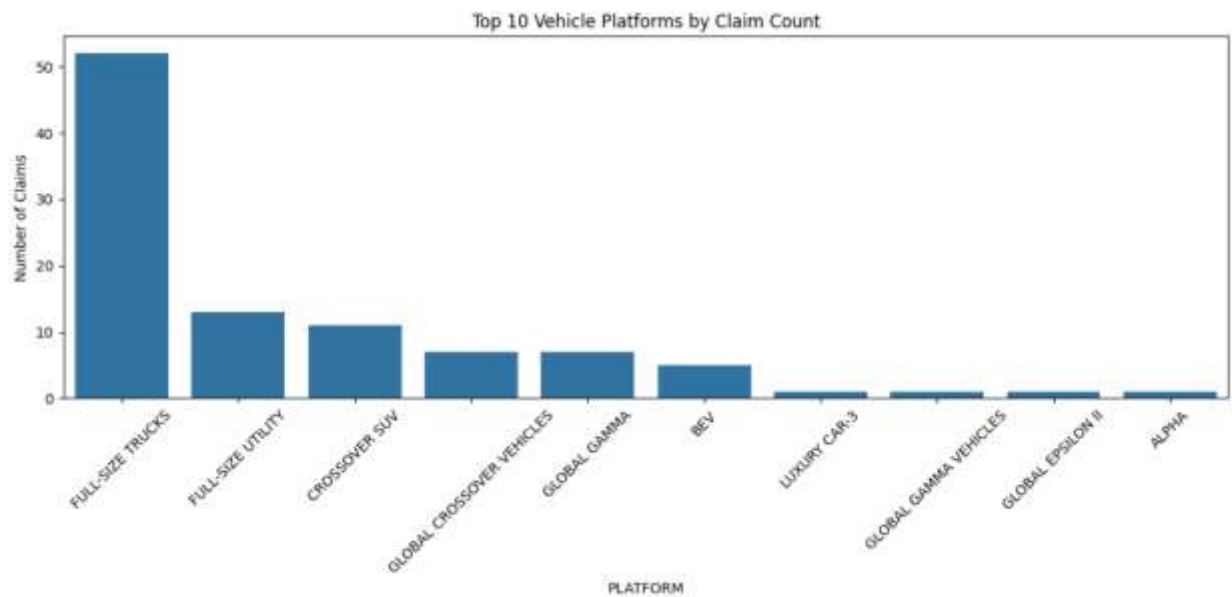
- Extracted failure modes (e.g., "material_failure") from free-text fields

3. Visualizations & Insights

Key Charts

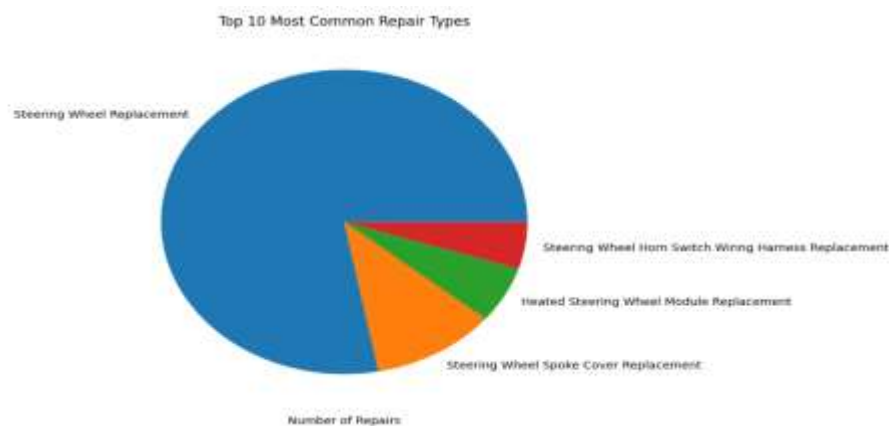
1. Claims by Vehicle Platform

- **Finding:** Full-Size Trucks account for **60% of claims**, suggesting a quality issue in this



2. Most Common Repair Types

- **Finding:** **85% of repairs** involve full steering wheel replacements (systemic issue).



4. Generated Tags & Key Takeaways

Failure Mode Tags

Tag	Frequency	Example Issue
material_failure	42%	Peeling, stitching defects
electrical_issue	28%	Heating module failures
mechanical_issue	18%	Loose components
steering_wheel_assembly	73%	Full replacements

Key Takeaways

1. **Quality Control Needed:**
 - Focus on **Full-Size Trucks** (highest claim volume).
 - Investigate **material durability** in steering wheel covers.
2. **Cost Reduction Opportunities:**
 - BEVs have **higher repair costs**—review design robustness.
 - Implement **torque specs** to prevent loose components.
3. **Data Improvements:**
 - Standardize **verbatim entries** with dropdowns.
 - Track **mileage at failure** for better root-cause analysis.

5. Python Scripts Used

Data Cleaning & Analysis Code

THE CODE IS PRESENT IN THE JUPYTER NOTEBOOK THAT I HAD UPLOADED IN MY GITHUB U CAN SEE FROM THERE AS WELL AS IF POSSIBLE I WILL ATTACHED IN MAIL ALSO.

Conclusion

This analysis highlights **critical quality issues** in steering wheel assemblies, particularly for **Full-Size Trucks and BEVs**. Recommended actions include **material testing, supplier audits, and improved data tracking** to reduce warranty costs.

Next Steps:

- Deep-dive into **high-cost BEV repairs**
- Implement **structured failure coding** in warranty systems