ANALYZING CUSTOMER SATISFACTION ACROSS PRODUCT CATEGORIES USING JASP: AN ANOVA AND POST-HOC REPORT

1. Background and Objective

A national retail brand in the US sought analytical support to understand how customer satisfaction varied across its three primary product categories: **Home Appliances**, **Electronics**, and **Personal Care**. The marketing analytics team wanted to move beyond descriptive metrics and obtain statistically supported insights that could guide product strategy and customer communication.

The project required a formal comparison of satisfaction ratings across groups using **JASP** with professional reporting for stakeholders with minimal statistical background.

Research Question: Are there statistically significant differences in customer satisfaction scores across product categories?

2. Dataset and Variable Summary

- **Sample Size:** 420 respondents
- **Collection Method:** Post-purchase survey, stratified by product category
- **Tool Used:** .csv file imported into JASP with labeled variable columns

Variables Used in Analysis:

Variable	Type	Scale	Description
Satisfaction_Score	Continuous	1–10 scale	Customer satisfaction score after purchase
Product_Category	Categorical	Nominal	3 groups: Home Appliances, Electronics, Personal Care
Gender	Categorical	Nominal	Optional covariate (not primary focus)
Purchase_Channel	Categorical	Nominal	Online or In-Store (used in later subgroup analyses)

3. Statistical Methodology in JASP

3.1 Descriptive Statistics

- Overall Mean Satisfaction Score: 7.18 (SD = 1.94)
- Distribution by Category:

Product Category	Mean Score	SD	n
Home Appliances	6.72	2.01	138
Electronics	7.65	1.61	142
Personal Care	7.17	1.90	140

Boxplots suggested differences but with slight variance inequality.

3.2 One-Way ANOVA

- **Null Hypothesis:** Mean satisfaction scores do not differ between product categories.
- **Assumptions checked:**
  - Normality → residuals approx. normal
  - Homogeneity of variance → Levene's Test p = 0.071 → assumption met

JASP Output:

Source	df	F	p	η^2 (effect size)
Product_Category	2	**8.91**	**< .001**	0.041
Residuals	417			

Interpretation: There is a **statistically significant difference** in customer satisfaction among the three categories. The effect size is small to moderate ($\eta^2 = 0.041$), suggesting product category accounts for ~4% of the variance in satisfaction.

3.3 Post-Hoc Comparison (Tukey HSD)

Comparison	Mean Difference	p-value
Electronics – Home Appliances	+0.93	< .001
Personal Care – Home Appliances	+0.45	0.029
Electronics – Personal Care	+0.48	0.041

Interpretation:

- Customers were **most satisfied** with **Electronics**, significantly more so than with Home Appliances and marginally more than Personal Care.
- **Home Appliances** consistently showed **lower satisfaction**, signaling an area for improvement.

4. Visualizations in JASP

- **Boxplot** of Satisfaction Scores by Category
- **Bar graph with error bars** (mean ± 95% CI)
- **Post-hoc table with significant pairwise markers**
- **Normal Q-Q plot** for model residuals

All visuals exported as vector-quality PNGs and formatted for use in internal decks.

5. Report Deliverables

- Full statistical report (APA-style, 14 pages)
- Executive summary with key recommendations for product team
- PowerPoint file (8 slides) for CMO-level review
- JASP file (.jasp) with analysis, outputs, and syntax settings
- Editable Excel sheet for internal KPI dashboards with annotated analysis fields

6. Key Insights and Strategic Use

- **Actionable Recommendation:** Focus on improving post-sale satisfaction touchpoints and product quality assurance for **Home Appliances**, which lagged in sentiment.
- **Decision-Making Value:** Supported data-driven prioritization of **category-specific follow-up surveys** and promotional incentives.
- **Departmental Impact:** Marketing, product development, and customer success teams all utilized this insight to refine category-level strategies.

7. Academic and Corporate Relevance

- **Academic:** Suitable for business analytics, marketing research, and applied statistics coursework involving ANOVA and customer metrics.

- **Corporate:** Ideal for consumer goods firms, retail analytics teams, or product managers seeking evidence-based differentiation of product lines.