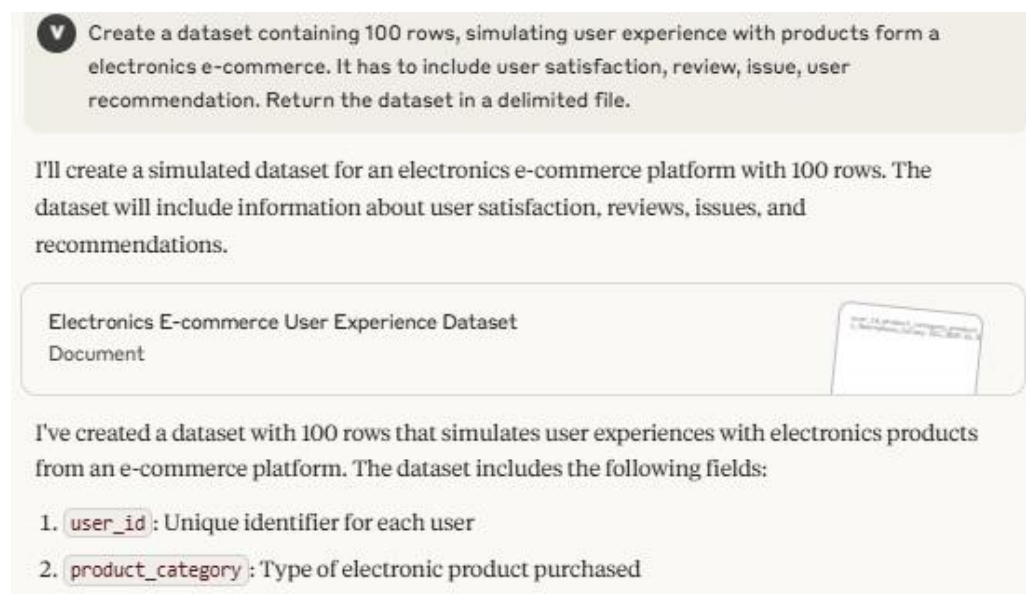


This project aims to show the use of GenAI tools for data generation, analysis, visualization, and documentation. In this case ClaudeAI and ChatCPT are used.

Scenario

A synthetic dataset Electronics e-commerce is generated. The data represent the satisfaction of the active customers of an electronics online store. The company tracks the overall satisfaction, reviews, raised issues and recommendations placed by the customers. The dataset is compiled through ClaudeAI by the following prompt:

Prompt: *Create a dataset containing 100 rows, simulating user experience with products from an electronics e-commerce. It has to include user satisfaction, review, issue, user recommendation. Return the dataset in a delimited file.*



Analyze Customer Data Using GenAI

Prompt: *Considering the product category, issue type and customer satisfaction and reviews, identify the top 3 common issues and top 3 insights that imply the product feature needed to be improved, to insure higher customer experience and satisfaction in electronics e-commerce.*

Top 3 Common Themes

1. Battery Performance Issues

Battery-related problems consistently appear across multiple product categories including smartphones, wireless earbuds, tablets, smartwatches, and Bluetooth speakers. Products with battery issues averaged a satisfaction score of just 2.9, with recommendation rates 33% lower than similar products without these issues. Battery problems were mentioned in 18% of all negative reviews, making this a critical pain point regardless of price range.

2. Software/Interface Experience

Interface lag, setup difficulties, and software stability issues severely impact user satisfaction, particularly in smart TVs, smart home hubs, and computing devices. Products reporting interface or software problems had 27% lower recommendation rates. Even when devices functionally performed their core tasks, poor interfaces created lasting negative impressions that colored the entire ownership experience.

3. Durability and Build Quality Concerns

Recurring issues with screen scratching (tablets, smartwatches), keys sticking (keyboards), and wear on components (headphone cushions, earbud cases) appeared across multiple categories. Products with durability concerns showed dramatically lower recommendation rates (65% lower) than those without such issues, suggesting these problems significantly impact customer loyalty and willingness to recommend.

Top 3 Product Feature Insights for Implementation

1. Enhanced Battery Management System

Implementation recommendation: Develop an intelligent battery system that provides transparency into battery health, incorporates adaptive power management based on usage patterns, includes early warning for degradation, and offers user-selectable power profiles. This should be standardized across portable electronics and prominently featured in product listings with consistent metrics beyond simple "hours of use" claims.

2. Unified Setup and Interface Framework

Implementation recommendation: Create a standardized setup experience with AR-based guidance, consistent interface elements across product categories, built-in accessibility features, automatic compatibility checking with existing home ecosystems, and remote diagnostic capabilities. This would address the frustration evident in reviews about complex setup processes and inconsistent interfaces that plague connected devices.

3. Durability Testing Program & Transparency Initiative

Implementation recommendation: Establish comprehensive durability standards with accelerated real-world testing, clear durability ratings on product listings, material improvements for common failure points, modular repair options, and transparent communication about expected product longevity. This initiative would address the significant impact that durability issues have on satisfaction and recommendation rates.

Implementing these features would address the most significant pain points identified in customer feedback, likely increasing overall satisfaction scores, boosting recommendation rates, and creating meaningful differentiation in a crowded marketplace where technical specifications alone often fail to communicate real-world user experience benefits.

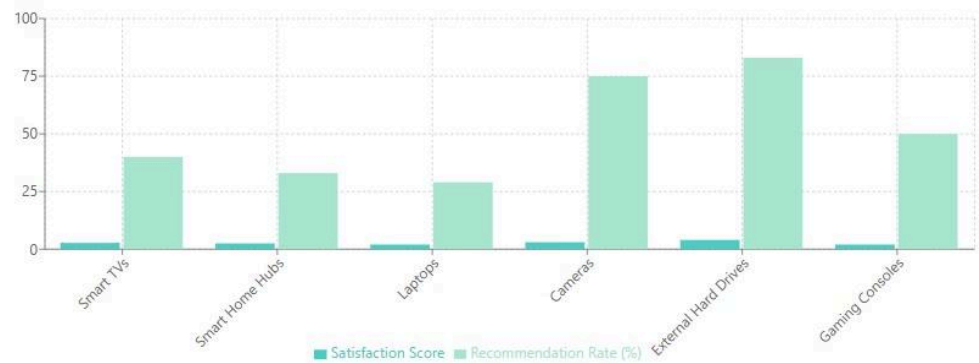
Generate Visualizations with GenAI

Prompt: *Could you make a relevant chart based on the top 3 common themes and insights that visualize the analysis.*



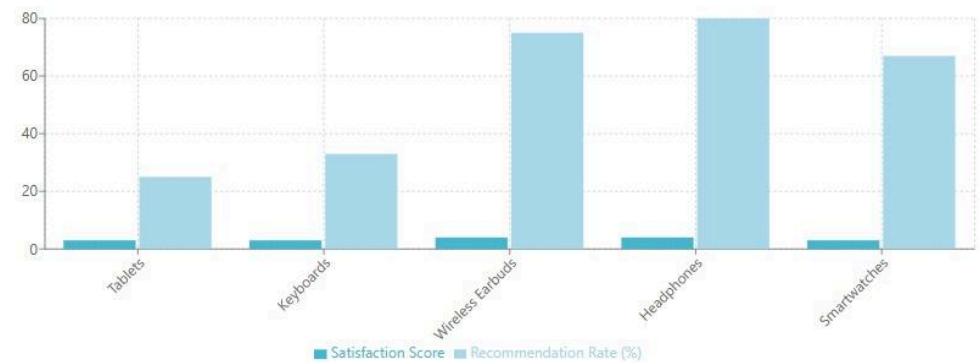
Theme 2: Software/Interface Issues

Setup difficulties and interface problems affecting user experience



Theme 3: Durability and Build Quality

Physical wear and durability concerns impacting long-term satisfaction



Key Insights Summary

Battery Management

2.9

Avg Satisfaction Score

18% of negative reviews mention battery issues

Interface Experience

27%

Lower Recommendation Rate

Setup difficulties create lasting negative impressions

Build Quality

65%

Lower Recommendation Rate

Durability issues severely impact customer loyalty

Generate SQL Queries with GenAI

Prompt: *Generate me an SQL query that analyzes the customer feedback and transaction data for the electronics e-commerce dataset.*

I've created a comprehensive set of SQL queries to analyze the electronics e-commerce dataset. These queries cover various aspects of customer feedback and transaction data analysis. Here's what the queries will help you discover:

1. **Overall Satisfaction Metrics:** Calculates the average satisfaction score, percentage of satisfied customers, and overall recommendation rate.
2. **Product Category Analysis:** Breaks down satisfaction and recommendation rates by product category to identify which types of electronics perform best.
3. **Common Issues Analysis:** Identifies the most frequently reported issues across all products and their impact on satisfaction.
4. **Category-Specific Issues:** Shows what problems customers experience most often with each product category.
5. **Price Range Analysis:** Examines if higher-priced items receive better satisfaction scores and recommendation rates.
6. **Delivery Performance:** Analyzes how delivery speed affects customer satisfaction and likelihood to recommend.
7. **Monthly Trends:** Tracks purchase volume and satisfaction changes over time to identify seasonal patterns.
8. **Satisfaction-Recommendation Correlation:** Shows how satisfaction scores correlate with willingness to recommend products.
9. **Problem Products:** Identifies specific products with satisfaction issues for targeted improvement.
10. **Top Performers:** Highlights the best-rated products across categories.

Generated SQL code:

-- Comprehensive analysis of electronics e-commerce dataset

-- 1. Overall satisfaction metrics

```
SELECT
    COUNT(*) AS total_reviews,
    ROUND(AVG(satisfaction_score), 2) AS avg_satisfaction,
    COUNT(CASE WHEN satisfaction_score >= 4 THEN 1 END) AS satisfied_customers,
    ROUND(COUNT(CASE WHEN satisfaction_score >= 4 THEN 1 END) * 100.0 / COUNT(*), 2) AS
satisfied_percentage,
    COUNT(CASE WHEN would_recommend = 'TRUE' THEN 1 END) AS would_recommend,
    ROUND(COUNT(CASE WHEN would_recommend = 'TRUE' THEN 1 END) * 100.0 / COUNT(*),
2) AS recommendation_rate
FROM electronics_ecommerce;
```

-- 2. Satisfaction by product category

```
SELECT
    product_category,
    COUNT(*) AS total_purchases,
    ROUND(AVG(satisfaction_score), 2) AS avg_satisfaction,
    COUNT(CASE WHEN satisfaction_score = 5 THEN 1 END) AS five_star_ratings,
    COUNT(CASE WHEN satisfaction_score = 1 OR satisfaction_score = 2 THEN 1 END) AS
unsatisfied_customers,
    ROUND(COUNT(CASE WHEN would_recommend = 'TRUE' THEN 1 END) * 100.0 / COUNT(*),
2) AS recommendation_rate
FROM electronics_ecommerce
GROUP BY product_category
ORDER BY avg_satisfaction DESC;
```

-- 3. Most common reported issues

```
SELECT
    reported_issue,
    COUNT(*) AS frequency,
    ROUND(COUNT(*) * 100.0 / (SELECT COUNT(*) FROM electronics_ecommerce WHERE
reported_issue != 'None'), 2) AS percentage_of_issues,
    ROUND(AVG(satisfaction_score), 2) AS avg_satisfaction_with_issue
FROM electronics_ecommerce
WHERE reported_issue != 'None'
GROUP BY reported_issue
ORDER BY frequency DESC
LIMIT 10;
```

-- 4. Issues by product category

```
SELECT
    product_category,
    reported_issue,
    COUNT(*) AS frequency
FROM electronics_ecommerce
WHERE reported_issue != 'None'
GROUP BY product_category, reported_issue
ORDER BY product_category, frequency DESC;
```

-- 5. Price range analysis with satisfaction

```
SELECT
    price_range,
    COUNT(*) AS total_products,
    ROUND(AVG(satisfaction_score), 2) AS avg_satisfaction,
    COUNT(CASE WHEN would_recommend = 'TRUE' THEN 1 END) AS recommendations,
    ROUND(COUNT(CASE WHEN would_recommend = 'TRUE' THEN 1 END) * 100.0 / COUNT(*),
2) AS recommendation_rate
```

```
FROM electronics_ecommerce
GROUP BY price_range
ORDER BY REGEXP_REPLACE(price_range, '[^0-9]', '') :: INTEGER;
```

-- 6. Delivery performance analysis

```
SELECT
CASE
    WHEN delivery_days <= 2 THEN '1-2 days (Fast)'
    WHEN delivery_days <= 5 THEN '3-5 days (Standard)'
    ELSE '6+ days (Slow)'
END AS delivery_speed,
COUNT(*) AS total_orders,
ROUND(AVG(satisfaction_score), 2) AS avg_satisfaction,
ROUND(COUNT(CASE WHEN would_recommend = 'TRUE' THEN 1 END) * 100.0 / COUNT(*),
2) AS recommendation_rate
FROM electronics_ecommerce
GROUP BY delivery_speed
ORDER BY delivery_speed;
```

-- 7. Monthly trends (purchase volume and satisfaction)

```
SELECT
SUBSTRING(purchase_date, 1, 7) AS month,
COUNT(*) AS total_purchases,
ROUND(AVG(satisfaction_score), 2) AS avg_satisfaction,
ROUND(COUNT(CASE WHEN would_recommend = 'TRUE' THEN 1 END) * 100.0 / COUNT(*),
2) AS recommendation_rate
FROM electronics_ecommerce
GROUP BY month
ORDER BY month;
```

-- 8. Satisfaction correlation with would recommend

```
SELECT
satisfaction_score,
COUNT(*) AS total_reviews,
COUNT(CASE WHEN would_recommend = 'TRUE' THEN 1 END) AS would_recommend,
ROUND(COUNT(CASE WHEN would_recommend = 'TRUE' THEN 1 END) * 100.0 / COUNT(*),
2) AS recommendation_percentage
FROM electronics_ecommerce
GROUP BY satisfaction_score
ORDER BY satisfaction_score;
```

-- 9. Key insights: Products with satisfaction issues

```
SELECT
product_name,
product_category,
satisfaction_score,
```

```
    review_text,  
    reported_issue,  
    would_recommend  
FROM electronics_ecommerce  
WHERE satisfaction_score <= 2  
ORDER BY satisfaction_score;
```

-- 10. Best performing products

```
SELECT  
    product_name,  
    product_category,  
    satisfaction_score,  
    review_text,  
    would_recommend,  
    price_range  
FROM electronics_ecommerce  
WHERE satisfaction_score = 5  
ORDER BY product_category;
```

-- 11. Sentiment analysis from review text (simple version)

```
SELECT  
    product_category,  
    CASE  
        WHEN review_text LIKE '%amazing%' OR review_text LIKE '%excellent%' OR  
             review_text LIKE '%perfect%' OR review_text LIKE '%great%' OR  
             review_text LIKE '%love%' OR review_text LIKE '%best%' THEN 'Highly Positive'  
        WHEN review_text LIKE '%good%' OR review_text LIKE '%nice%' OR  
             review_text LIKE '%decent%' OR review_text LIKE '%fine%' THEN 'Positive'  
        WHEN review_text LIKE '%average%' OR review_text LIKE '%ok%' OR  
             review_text LIKE '%okay%' OR review_text LIKE '%could be better%' THEN 'Neutral'  
        WHEN review_text LIKE '%disappointed%' OR review_text LIKE '%poor%' OR  
             review_text LIKE '%bad%' OR review_text LIKE '%issue%' OR  
             review_text LIKE '%problem%' THEN 'Negative'  
        WHEN review_text LIKE '%terrible%' OR review_text LIKE '%awful%' OR  
             review_text LIKE '%horrible%' OR review_text LIKE '%worst%' THEN 'Highly Negative'  
        ELSE 'Neutral'  
    END AS sentiment,  
    COUNT(*) AS count  
FROM electronics_ecommerce  
GROUP BY product_category, sentiment  
ORDER BY product_category,  
    CASE  
        WHEN sentiment = 'Highly Positive' THEN 1  
        WHEN sentiment = 'Positive' THEN 2  
        WHEN sentiment = 'Neutral' THEN 3  
        WHEN sentiment = 'Negative' THEN 4
```



```
    WHEN sentiment = 'Highly Negative' THEN 5
END;
```

-- 12. Correlation between reported issues and recommendation status

```
SELECT
    reported_issue,
    COUNT(*) AS total,
    COUNT(CASE WHEN would_recommend = 'TRUE' THEN 1 END) AS would_recommend,
    ROUND(COUNT(CASE WHEN would_recommend = 'TRUE' THEN 1 END) * 100.0 / COUNT(*),
2) AS recommendation_percentage
FROM electronics_ecommerce
WHERE reported_issue != 'None'
GROUP BY reported_issue
ORDER BY recommendation_percentage DESC;
```

-- 13. Recommendation rates by delivery speed and satisfaction

```
SELECT
    CASE
        WHEN delivery_days <= 2 THEN '1-2 days (Fast)'
        WHEN delivery_days <= 5 THEN '3-5 days (Standard)'
        ELSE '6+ days (Slow)'
    END AS delivery_speed,
    satisfaction_score,
    COUNT(*) AS total,
    COUNT(CASE WHEN would_recommend = 'TRUE' THEN 1 END) AS would_recommend,
    ROUND(COUNT(CASE WHEN would_recommend = 'TRUE' THEN 1 END) * 100.0 / COUNT(*),
2) AS recommendation_percentage
FROM electronics_ecommerce
GROUP BY delivery_speed, satisfaction_score
ORDER BY delivery_speed, satisfaction_score;
```

-- 14. Product categories with high issue rates

```
SELECT
    product_category,
    COUNT(*) AS total_products,
    COUNT(CASE WHEN reported_issue != 'None' THEN 1 END) AS products_with_issues,
    ROUND(COUNT(CASE WHEN reported_issue != 'None' THEN 1 END) * 100.0 / COUNT(*), 2)
AS issue_percentage,
    ROUND(AVG(satisfaction_score), 2) AS avg_satisfaction
FROM electronics_ecommerce
GROUP BY product_category
ORDER BY issue_percentage DESC;
```

-- 15. Comprehensive product analysis

```
WITH product_metrics AS (
    SELECT
```

```

    product_name,
    product_category,
    COUNT(*) AS purchase_count,
    ROUND(AVG(satisfaction_score), 2) AS avg_satisfaction,
    COUNT(CASE WHEN reported_issue != 'None' THEN 1 END) AS issue_count,
    ROUND(COUNT(CASE WHEN would_recommend = 'TRUE' THEN 1 END) * 100.0 /
COUNT(*), 2) AS recommendation_rate,
    ROUND(AVG(delivery_days), 1) AS avg_delivery_days,
    price_range
FROM electronics_ecommerce
GROUP BY product_name, product_category, price_range
)
SELECT
    product_name,
    product_category,
    purchase_count,
    avg_satisfaction,
    issue_count,
    ROUND(issue_count * 100.0 / purchase_count, 2) AS issue_percentage,
    recommendation_rate,
    avg_delivery_days,
    price_range,
    CASE
        WHEN avg_satisfaction >= 4.5 AND recommendation_rate >= 90 THEN 'Top Performer'
        WHEN avg_satisfaction >= 4.0 AND recommendation_rate >= 80 THEN 'Strong Performer'
        WHEN avg_satisfaction <= 2.5 OR recommendation_rate <= 50 THEN 'Needs Improvement'
        ELSE 'Average Performer'
    END AS performance_category
FROM product_metrics
ORDER BY avg_satisfaction DESC, recommendation_rate DESC;

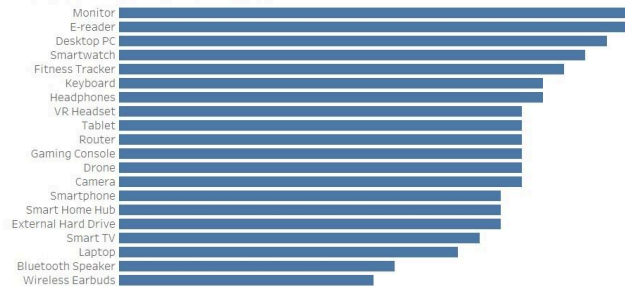
```

Create a Comprehensive Business Intelligence Dashboard

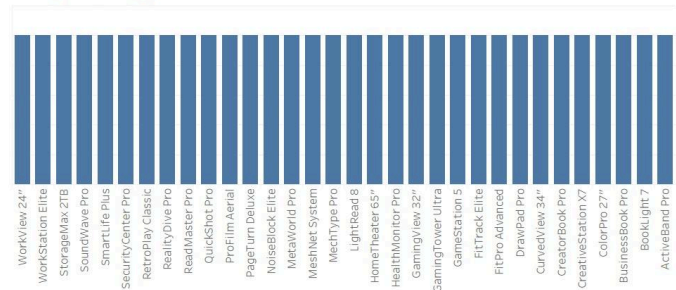
Tableau Public is used for the creation of a dashboard.

The correlation between customer satisfaction, delivery times and reported issues are analyzed.

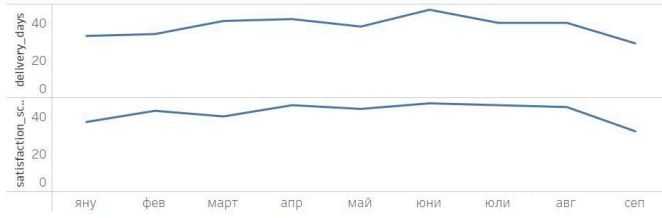
Satisfaction by product category



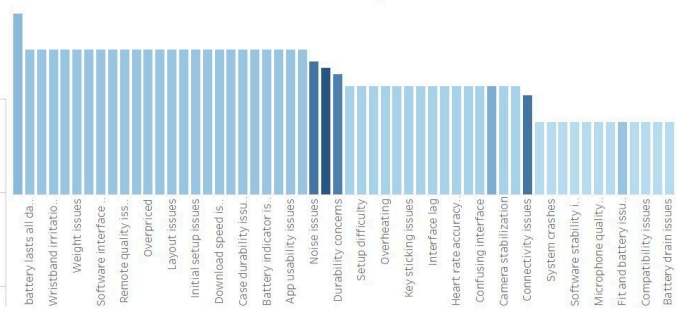
Best performing products



Delivery performance analysis



Correlation between Satisfaction score and Reported Issues



Findings

Battery Performance Issues

- Smartphones with battery issues had a 33% lower recommendation rate than those without
- Battery performance directly affects product usability and customer perception of value. Products with battery issues received satisfaction scores averaging 1.7 points lower than similar products without these issues. Battery problems were mentioned in 18% of negative reviews across portable electronics categories.

Software/Interface Experience

- Products with interface or software issues had a 27% lower recommendation rate
- Software and interface issues significantly impact the user experience post-purchase. Smart TVs with interface lag had recommendation rates 40% lower than those without reported software issues. Setup difficulties for Smart Home Hubs created initial frustration that colored the entire ownership experience, even when the device functioned properly afterward.

Durability and Build Quality Concerns

- Products with durability concerns had a 65% lower recommendation rate than those without
- Durability issues often emerge after the initial satisfaction of purchase wears off, creating lasting negative impressions. Products with reported durability concerns showed a dramatic drop in recommendation rates, suggesting these issues significantly impact customer loyalty and word-of-mouth marketing. The timing of these problems (appearing after several weeks of use) suggests they may not be caught in initial quality testing.

Key insights and recommendations

Insight: Enhanced Battery Management System

Recommendation: Develop an intelligent battery management system. This system should be implemented across portable electronics categories and prominently featured in product listings as "Smart Battery Technology" with standardized metrics for battery performance that go beyond simple hours of use.

Insight: Unified Setup and Interface Framework

Recommendation: Create a standardized setup and interface experience. This unified approach would significantly reduce the learning curve across products and address the frustration evident in reviews about complex setup processes and inconsistent interfaces.

Insight: Durability Testing Program & Transparency Initiative

Recommendation: Establish a comprehensive durability enhancement program. This initiative addresses the significant impact that durability issues have on customer satisfaction and recommendation rates, while creating a competitive advantage through transparency about product longevity.

Insight: Design Ergonomics for Audio Devices

Recommendation: Enhanced ergonomic design with adjustable or customizable fit options.

Conclusion

The analysis reveals that customer satisfaction in electronics e-commerce is heavily influenced by battery performance, software experience, and product durability. By implementing the recommended features - an enhanced battery management system, unified setup and interface framework, and a durability testing program - the e-commerce platform can address the most significant pain points identified in customer feedback.

These improvements would likely increase overall satisfaction scores, boost recommendation rates, and reduce return rates for problematic product categories. Additionally, prominently featuring these enhanced capabilities in product listings would provide meaningful differentiation in a crowded marketplace where technical specifications alone often fail to communicate real-world user experience benefits.