Uncovering Sales Disparities: A Category-Level Performance Audit by Store

Project Background

Apple Inc. is a global leader in consumer electronics, operating hundreds of retail stores worldwide. Since its retail launch in 2001, Apple has maintained a premium brand presence by offering a curated selection of products in highly controlled retail environments. As a data analyst working within the company's retail analytics division, our goal is to support store and regional managers in identifying and correcting misalignments between store-level sales patterns and broader national trends.

The core objective of this project is to surface category-level revenue imbalances and uncover "Revenue Opportunities" where stores underperform relative to their country benchmark in specific product categories. The analysis spans Apple fiscal sales periods from Q2 2020 through Q4 2024, covering 69 stores across multiple countries.

Insights and recommendations are provided on the following key areas:

- Temporal Sales Trends
- Store-Level Revenue Opportunities
- Performance Consistency

An interactive Tableau dashboard can be downloaded **here** and viewed **here**

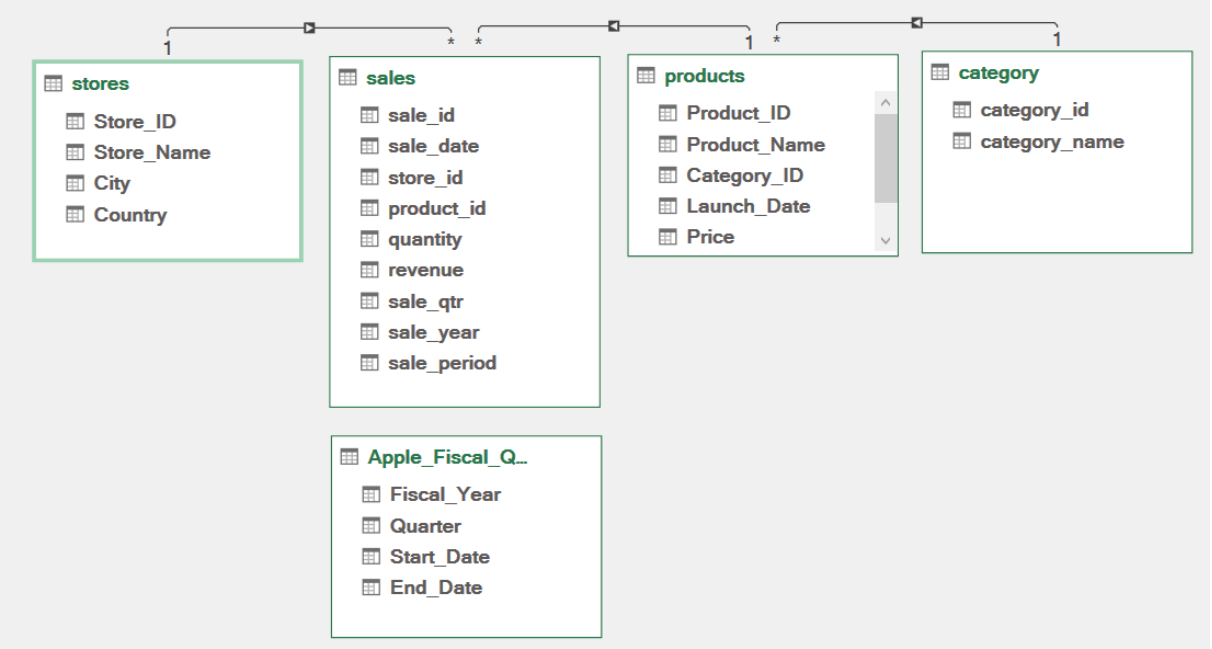
The JAX code used in Microsoft Power Pivot for Excel that was used to clean and organize the data for the dashboard can be found **here**

The Python code used to perform the chi-squared tests can be found **here**

Data Structure & Initial Checks

The company's main database structure consists of five tables with a total of approximately 1 million records:

- **Stores**: Contains information about Apple retail locations.
- **Category**: Describes product category groupings.
- **Products**: Lists individual products, linked to categories.
- **Sales**: Includes all sales transactions.
- **Apple Fiscal Quarters**: Contains dates for Apple Inc. financial periods to align with sale.sale_date



Before classifying categories as *underperforming* or *overperforming*, it is important to determine whether a store's category-level revenue distribution can be reasonably compared to that of its country.

To address this, a Chi-Squared test was performed to assess whether the distribution of category revenue percentages at the store level aligns with the corresponding country-level distribution. The analysis covered Apple fiscal quarters from Q2 2020 through Q4 2024, across 69 stores and 19 sales periods—resulting in 1,311 individual tests.

The results were conclusive: **99% of p-values exceeded 0.90** and **99.9% exceeded 0.75**, providing strong statistical support that store-level category sales are proportionally consistent with country-level category distributions.

Executive Summary

Overview of Findings

This analysis revealed consistent category sales patterns across countries, with most stores closely matching their national category revenue distributions. However, certain categories and stores showed statistically significant deviations, indicating potential "Revenue Opportunities." These insights equip store managers with actionable targets for improving category performance

Key Findings:

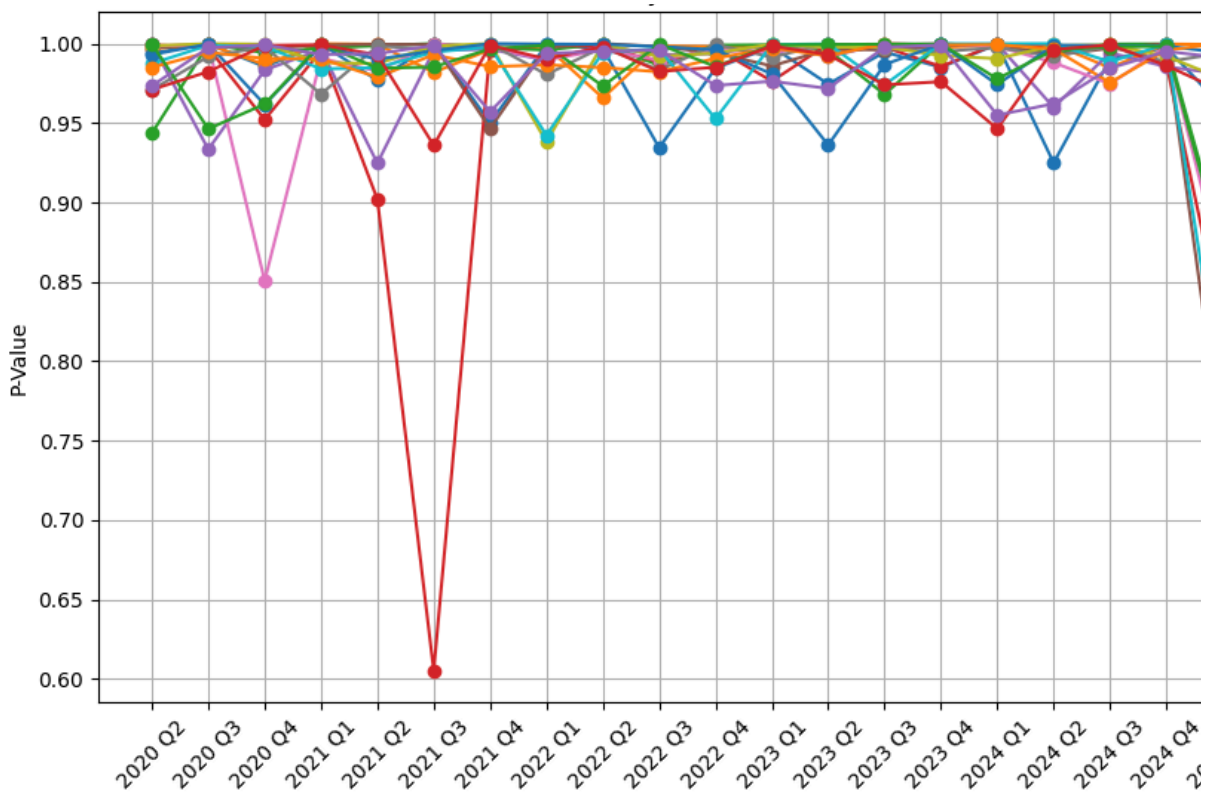
1. Store category revenue distributions align with country-level benchmarks in 99% of cases (Chi-Squared test p-value > 0.9).
2. There is no evidence of seasonality in category underperformance. This is a year-round opportunity.
3. Some stores consistently underperform in specific categories over multiple quarters. High-performing stores offer benchmarks for peer learning and best practice sharing.

Insights Deep Dive

Temporal Sales Trends

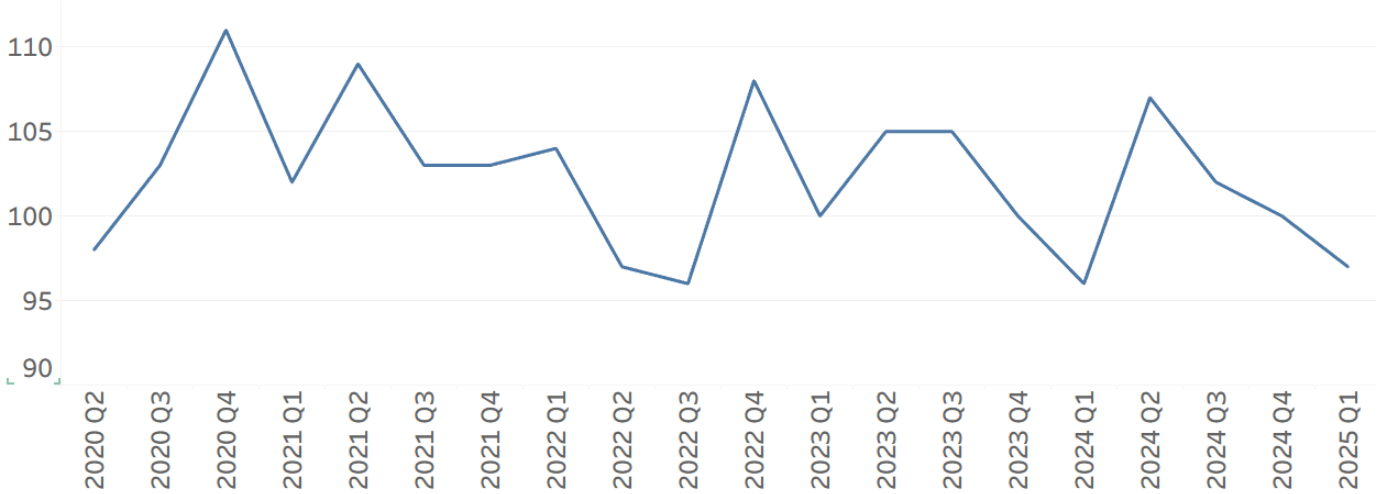
- Insight 1:.The validity of expecting store category proportionality on the store-level is very high for every quarter, store, and country analysed.

P-value Trends from Chi-Squared Tests (consistently high goodness-of-fit)



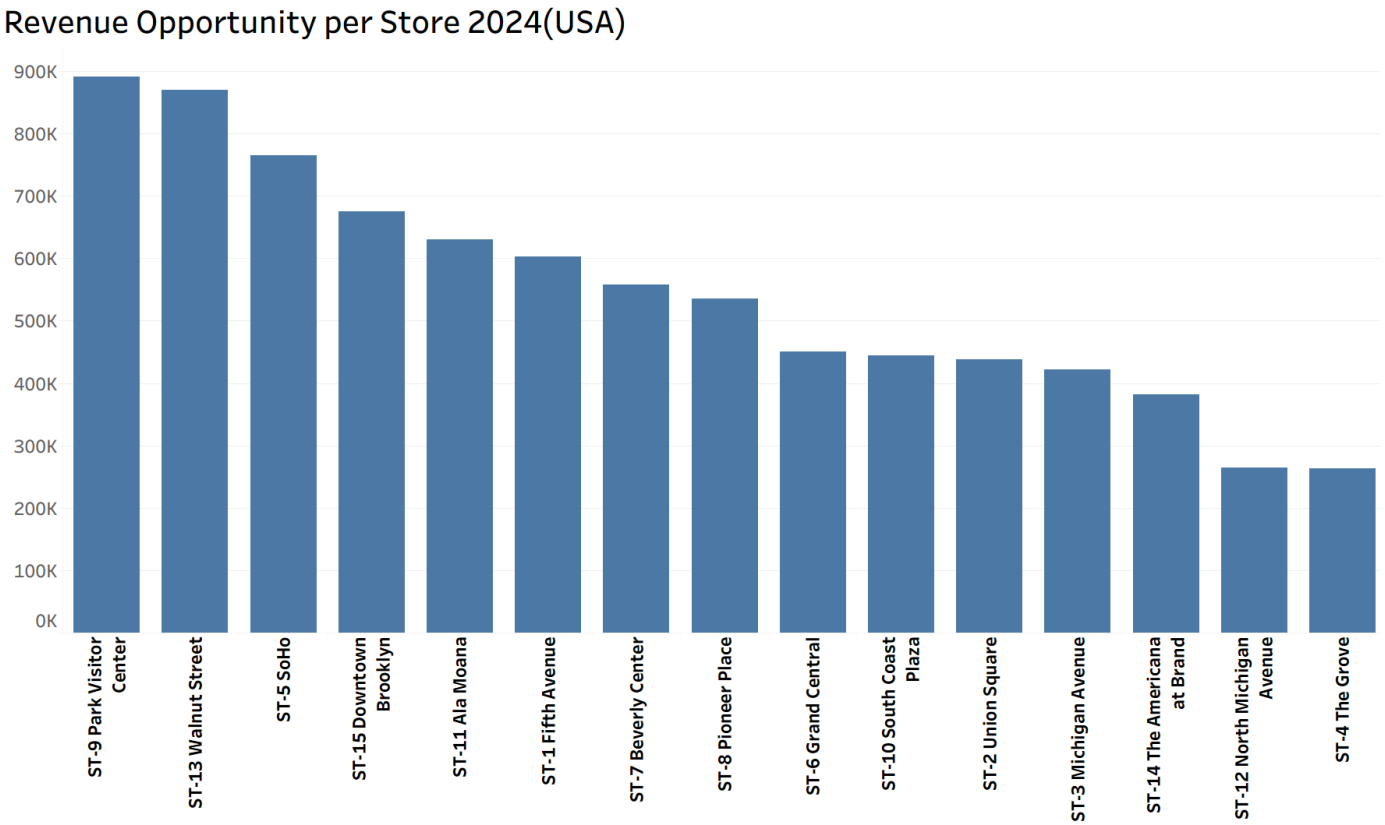
- Insight 2: The number of underperforming categories across all 69 stores varied between 96 categories and 111 categories with no signs of seasonality.

# of Underperforming Categories per Sales Period (no seasonality)



Store-Level Revenue Opportunities

- Insight 1: Every store has had quarters of category-level underperformance and therefore revenue opportunity.



- Insight 2: High-performing peers (Role Models) provide successful category benchmarks.

Example for the United States Market

United States (15 stores) **Total Opportunity: $1,857,199 (3.0%)**

Category Audit

	2024 Q1	2024 Q2	2024 Q3	2024 Q4
ST-1 Fifth Avenue: Accessories				
Audio				
Desktop				
Laptop				
Smart Speaker				
Smartphone				
Streaming Device				
Subscription Service				
Tablet				
Wearable				
Accessories				

Revenue Opportunity

	2024 Q1	2024 Q2	2024 Q3	2024 Q4
ST-1 Fifth Avenue		$259,675 6%	$194,508 4%	$148,816 3%
ST-2 Union Square	$95,861 2%	$44,560 1%	$82,485 2%	$215,547 5%
ST-3 Michigan Avenue	$112,429 3%	$90,439 2%	$57,121 1%	$162,155 4%
ST-4 The Grove			$147,333 3%	$115,938 3%
ST-5 SoHo	$390,015 9%	$169,546 4%	$132,155 3%	$73,781 2%
ST-6 Grand Central	$130,948 3%	$32,851 1%	$199,006 5%	$87,896 2%
ST-7 Beverly Center	$185,685 4%	$202,242 5%	$62,433 1%	$107,325 3%
ST-8 Pioneer Place	$286,988 7%	$74,149 2%	$134,485 3%	$39,379 1%
ST-9 Park Visitor Center	$382,161	$258,132	$176,814	$74,452

Role Model Stores

(Highest Perc Revenue in Cat)

ST-1 Fifth Avenue	Desktop	ST-5 SoHo
	Laptop	ST-13 Walnut Street
ST-10 South Coast Pl..	Subscription Service	ST-11 Ala Moana
ST-11 Ala Moana	Laptop	ST-13 Walnut Street
ST-12 North Michigan Avenue	Desktop	ST-5 SoHo
	Subscription Service	ST-11 Ala Moana
ST-13 Walnut Street	Accessories	ST-12 North Michigan A
	Audio	ST-9 Park Visitor Center
ST-14 The Americana at Brand	Laptop	ST-13 Walnut Street
	Wearable	ST-7 Beverly Center
ST-15 Downtown Brooklyn	Accessories	ST-12 North Michigan A
	Streaming Device	ST-10 South Coast Plaza
ST-2 Union Square	Tablet	ST-6 Grand Central

In Q4 2024 ST-1 Fifth Avenue underperformed in the *Desktop* and *Laptop* categories . ST-5 SoHo and ST-13 Walnut Street are recommended as potential sharers of best-practice

Performance Consistency

- Insight 1: Certain stores exhibit stable category shares quarter-over-quarter.
- Insight 2: Inconsistent performers often show misalignment in at least two categories.
- Insight 3: Stores with high Z-score volatility may be affected by local inventory or training gaps.

Example for ST-5 SoHo

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The Smartphone category underperformed 3 of 4 quarters in 2024. This could indicate a distribution or training gap.

Recommendations

Based on the insights and findings above, we would recommend the **Retail Strategy & Regional Management Team** to consider the following:

- Investigate operational causes (staff training, merchandising, local promotions) behind recurring category underperformance.
- Use high-performing stores as benchmarks to guide category growth strategy for underperformers.
- Set store-level performance KPIs based on national category benchmarks to guide local initiatives.

- Prioritize intervention in stores with repeated underperformance over multiple quarters.

Assumptions and Caveats

- Some stores were the only store in their county (e.g ST-20 Kaerntner Strasse in Austria); these were excluded from statistical testing.
- The analysis assumes category definitions remained stable across the analysis window.
- Store-level sales are compared to national benchmarks assuming uniform product availability.
- Sale period labels such as "2024 Q4" represent Apple's fiscal calendar, not Gregorian quarters.
- Z-score thresholds were set at ±1.5 standard deviations based on industry convention for outlier detection.