POS System Analytics Dashboard

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Project Overview

This project showcases a complete Business Intelligence solution built for a Point of Sale (POS) system, leveraging the full potential of Power BI and Snowflake SQL to unlock insights from retail data. Designed with both executives and analysts in mind, it includes interactive dashboards, dynamic visualizations, and deep analytical models across three major perspectives:

1. **Overview Dashboard** – Focuses on high-level KPIs, category-wise performance, and overall transaction health

2. **Store Performance Dashboard** – Evaluates the efficiency of stores based on transaction behavior, customer repeat patterns, and revenue strategies

3. **Product Performance Dashboard** – Analyzes top-performing products, pricing strategies, repeat purchases, and category positioning

The data pipeline is built from raw CSV files hosted on AWS S3 and processed using Snowflake SQL, with over 20 analytical views created using CTEs, window functions, and aggregate logic.

Overview Dashboard

Key Business Indicators

- **Total Revenue:** $82.49 million
- **Total Quantity Sold:** 2.43 million units
- **Total Transactions:** 490,987
- **Average Quantity per Transaction:** 4.96
- **Average Revenue per Transaction:** $168.01
- **Average Revenue per Month:** $6.87 million

Category-Wise Insights

- **Electronics:** Highest contributor to revenue (83.57%) despite lower sales volume
- **Grocery:** Highest in quantity sold (94.21%) but lower revenue contribution (13%)
- **Clothing:** Minimal share in both revenue (3.43%) and quantity, but with selective high performers

Top Products by Performance

- **Revenue:** iPhone 15 Pro – $11.37M
- **Quantity:** Bananas (1lb) – 211K units

Store Contributions

- **Harmony Square 45**: $6.2M revenue from 38K transactions
- **Simply Goods 70**: $3.8M revenue, higher ATV of $170 (vs Harmony Square's $165)
- 74.94% of revenue is spread across many smaller stores labeled as "Other Stores"

Store Performance Analysis

Metrics Evaluated:

- **Store Revenue**, **Transaction Volume**, **ATV**, **Average Transactions per Customer**

Key Observations:

- **Store A (Harmony Square 45):** High volume, moderate ATV; revenue driven by footfall

- **Store B (Simply Goods 70):** Lower traffic but higher ATV; focuses on high-value transactions

Efficiency Matrix (Quadrant Analysis):

- **Top-Right Quadrant:** High ATV + High Transactions (most efficient)
- **Bottom-Right Quadrant:** High Transactions + Low ATV (volume-driven stores)
- **Top-Left Quadrant:** High ATV + Low Transactions (niche premium stores)
- **Bottom-Left Quadrant:** Low ATV + Low Transactions (underperformers)

Recommendations:

- Increase ATV in volume-driven stores via upselling/bundling
- Boost customer visits in high-ATV stores via marketing/loyalty programs
- Focus on retention strategies to raise average transactions per customer (currently ranging 1.1–1.6)

Product Performance Analysis

Revenue by Category:

- **Electronics:** $68.94M (83.57%)
- **Grocery:** $10.72M (13%)
- **Clothing:** $2.83M (3.43%)

Product-Level Performance

Clothing:

- Top Sellers (Qty): Adidas T-Shirt, Calvin Klein Underwear, Levi's Jeans
- Top Earners (Revenue): North Face Jacket, Nike Air Force 1, Levi's Jeans
- Insights: High-value items perform well despite lower volume; ASP ~$70.21

Electronics:

- Top Sellers (Qty): Sony WH-1000XM5, Galaxy S23, Nintendo Switch
- Top Earners: iPhone 15 Pro, MacBook Air, Galaxy S23
- ASP: ~$684.61
- Moderate repeat purchase rates (9–14%)

Grocery:

- Top Sellers: Bananas, Whole Milk, Eggs
- Top Earners: Chicken Breast, Ground Coffee, Coca-Cola 12pk
- ASP: ~$4.67
- Repeat purchases: High (42–58%)

Repeat Purchase Analysis

- **Grocery**: High loyalty (Bananas 58%, Milk 56%, Eggs 54%)
- **Electronics**: Moderate loyalty (Sony WH-1000XM5 – 14%)
- **Clothing**: Low loyalty (Adidas T-shirt – 9.5%, others ~4–6%)

Pricing Strategy Insights (via Bubble Chart)

- **High Volume, Low Price**: Grocery staples – high frequency, low margin
- **Low Volume, High Price**: Premium electronics – low repeat, high impact
- **Balanced Performers**: Mid-tier electronics and value products
- **Weak Performers**: Clothing with both low volume and low revenue

Strategic Suggestions:

- Expand top electronics & promote accessories
- Bundle grocery items to improve revenue per basket
- Use trend-based, personalized campaigns for clothing
  Consider financing/warranty upsells for electronics

Business Impact & Value Delivery

- Identified top revenue stores and key product performers
- Differentiated revenue strategies: volume-based vs premium-based
- Informed decisions on store efficiency and pricing optimization
- Highlighted category-level and product-level contribution to total profit
- Provided insights into customer behavior and loyalty for better targeting

The dashboards transform raw transactional data into meaningful KPIs, enabling tactical and strategic retail decisions. This project demonstrates not just BI tool mastery, but real-world analytical thinking and data-driven storytelling.

Technical Stack & Engineering ImplementationPower BI:

Designed three interactive dashboards with slicers, KPI cards, trend charts, pie/donut visuals, and matrix tables; all visuals are optimized for readability and minimal scroll.

Snowflake SQL: Implemented multi-layered views using CTEs, ranking functions, pivot tables, and advanced window functions for transaction, customer, and product metrics.

AWS S3: All raw data files (transactions, customers, stores, products) were securely ingested from Amazon S3 using Snowflake's STAGE and FILE FORMAT features.

DAX (Power BI): Created dynamic KPI cards (Total Revenue, AOV, Quantity per Transaction), monthly/quarterly sales calculations, revenue shares, and growth rates.

ETL Simulation: Though traditional ETL tools were not used, transformation logic was implemented within Snowflake views mimicking real-world data modeling pipelines.

This tech stack mirrors real-time business intelligence workflows used by data-driven organizations, and it demonstrates full-stack analytics capability — from raw ingestion to executive-ready insights.

About Me

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Let the data tell the story, and make decisions that move business forward.