

Business Performance & KPI Analysis

Project Overview:

- Project Title: Business Performance & KPI Dashboard - Critical Thinking Analysis
- Tools Used: Python, SQL (MySQL), Power BI
- Dataset: Superstore Sales Data (9,994 records)

Abstract:

This project analyzes business sales data to evaluate revenue, profit, and performance across categories and regions. Python was used for data cleaning and preparation, SQL was used for KPI analysis and view creation, and Power BI was used for interactive dashboard visualization. The dashboard provides insights into monthly trends, category-wise performance, and regional revenue distribution to support data-driven business decisions.

Problem Statement:

Organizations often measure success through revenue growth, but this metric can be misleading. High sales don't always guarantee profitability—aggressive discounting, operational inefficiencies, and poor product mix can erode margins despite strong revenue figures.

This project analyzes retail sales data to answer: "Are high-revenue categories and regions truly profitable, or do they hide critical business challenges?" By examining the relationship between revenue, profit margins, discount strategies, and regional performance, this analysis aims to identify misleading KPIs and provide actionable recommendations for sustainable business growth.

Objectives:

- Analyze revenue vs. profitability across product categories and regions to identify misleading performance indicators
- Evaluate the impact of discount strategies on profit margins and determine optimal discount thresholds
- Identify high-revenue but low-profit business areas requiring strategic intervention
- Develop an interactive Power BI dashboard to enable data-driven decision-making with balanced KPIs

Technologies & Skills Used:

SQL (MySQL): Data extraction, aggregation, complex queries, KPI calculations, and analytical view creation

Power BI: Interactive dashboard design with KPIs, trend charts, filters, and drill-down capabilities

DAX: Custom measures for Revenue, Profit, Profit Margin %, and Average Order Value calculations

Python (Pandas, NumPy, Matplotlib, Seaborn): Data cleaning, transformation, exploratory analysis, and visualization

Data Analysis: Profitability analysis, discount impact assessment, trend analysis, and regional performance comparison

Business Intelligence: KPI framework design, strategic recommendations, and data-driven decision support

Methodology:

1. Data Preparation (Python)

- Cleaned and processed 9,994 transaction records
- Created calculated metrics: profit_margin, order_year, order_month
- Exported structured data to MySQL database

2. SQL Analysis (MySQL)

Performed comprehensive analysis using SQL queries:

- Overall KPI calculations (Revenue, Profit, Margins)
- Monthly trend analysis
- Category and regional performance comparison
- Discount impact assessment
- Sub-category profitability ranking

3. Visualization (Power BI)

Built interactive dashboard featuring:

- KPI cards for key metrics
- Monthly revenue & profit trends
- Category performance comparison
- Regional distribution analysis
- Dynamic filters for year and region

SQL Analysis & Key Findings

Overall Business Performance Metrics

Core KPIs analyzed to establish baseline revenue, profit, and margin metrics.

	total_revenue	total_profit	profit_margin
▶	2297200.860299955	286397.0217000013	0.125

Observation:

Total revenue of \$2.3M with \$286K profit yields 12.5% margin—indicating potential efficiency issues requiring category-level investigation.

Category-Level Profitability Analysis

Revenue and profit analyzed across categories to identify true business segment performance.

	category	revenue	profit	profit_margin
▶	Technology	836154.0329999966	145454.9480999999	0.174
	Furniture	741999.7952999998	18451.2728	0.025
	Office Supplies	719047.0320000029	122490.80080000011	0.17

Observation:

Furniture generates \$742K revenue but only 2.5% margin, while Technology achieves 17.4%—proving high sales don't guarantee profitability.

Discount Strategy Impact Assessment

Profitability evaluated across discount levels to determine maximum safe discount limits.

	discount_level	revenue	profit	profit_margin
▶	0	1087908.4699999911	320987.6031999998	0.295
	0.1	54369.35100000001	9029.176999999998	0.166
	0.15	27558.521500000006	1418.9915	0.051
	0.2	764594.3680000046	90337.30600000004	0.118
	0.3	103226.65499999988	-10369.27739999997	-0.1
	0.32	14493.458799999999	-2391.1377000000007	-0.165
	0.4	116417.78400000009	-23057.05040000001	-0.198
	0.45	5484.974	-2493.1111	-0.455
	0.5	58918.53999999998	-20506.42809999997	-0.348
	0.6	6644.70000000003	-5944.655200000002	-0.895
	0.7	40620.282000000065	-40075.356899999955	-0.987
	0.8	16963.755999999999	-30539.039199999985	-1.8

Observation:

Discounts above 30% result in negative margins (ranging from -10% to -180%), with profit losses of \$10K-\$30K- aggressive discounting destroys profitability despite boosting revenue.

Regional Revenue and Margin Comparison

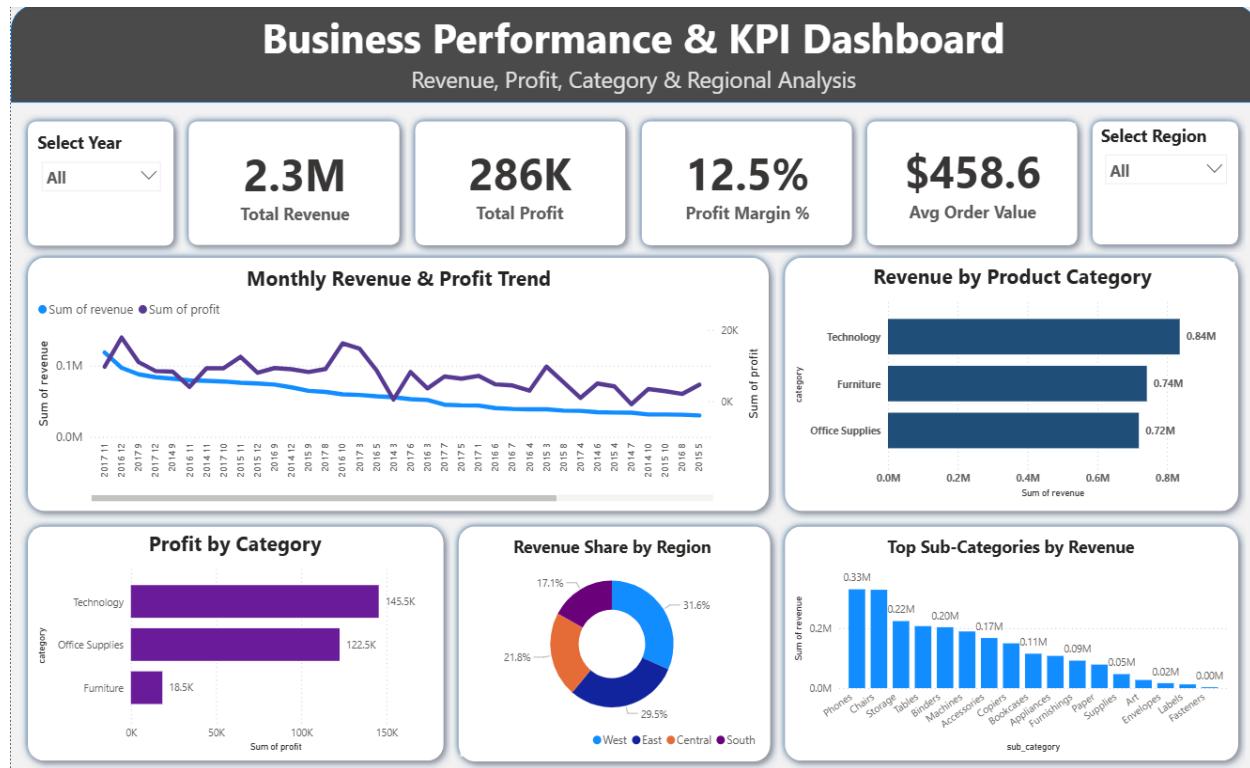
Geographic performance compared to identify operational efficiency variations across regions.

	region	revenue	profit	profit_margin
▶	West	725457.824500006	108418.44890000018	0.149
	East	678781.2399999979	91522.78000000026	0.135
	Central	501239.890800005	39706.36249999998	0.079
	South	391721.9050000003	46749.430300000065	0.119

Observation:

West region leads with 14.9% margin while Central shows only 7.9%- revealing a 7-point efficiency gap requiring immediate attention.

Power BI Dashboard:



Interactive Features:

- Year and Region filters for dynamic analysis
- Real-time KPI tracking
- Trend analysis with dual-axis charts
- Category and sub-category drill-downs
- Geographic performance visualization

Dashboard Purpose:

Enables stakeholders to explore data interactively and make informed decisions based on both revenue AND profitability metrics.

Key Findings

- Overall Performance Metrics
- Total Revenue: \$2.3M
- Total Profit: 286K
- Profit Margin: 12.5%
- Average Order Value: \$458.6

Business Recommendations

Furniture Category Issue

- Furniture brings in \$742K revenue but only 2.5% profit margin. This means we're selling a lot but making very little money. We should review pricing, cut unnecessary costs, and focus on profitable products. Target: Increase margin to 10% = ~\$55K more profit.

Discount Problem

- Discounts above 30% are causing losses. We need to cap discounts at 20-25% and require manager approval for anything higher. This simple change can save ~\$50K annually.

Central Region Performance

- Central region has 7.9% margin while West region has 14.9%. We should study what West is doing right and apply those practices in Central region. Potential gain: ~\$30K profit.

Better KPIs Needed

- We're focusing too much on revenue and ignoring profit margins. Adding profit margin as a main KPI will help make smarter business decisions.

Total Impact: These changes could add \$135K profit (47% increase).

Conclusion:

This project reveals that high revenue doesn't always mean high profit. Using Python, SQL, and Power BI, the analysis uncovered critical issues hidden behind strong sales numbers—a high-revenue category with only 2.5% margin, discount strategies destroying profitability, and regional performance gaps of up to 7 percentage points. The key finding is clear: businesses can't rely on revenue alone. Without tracking profit margins, companies risk making decisions that boost sales but reduce actual profitability.

By implementing the recommended changes—optimizing pricing, controlling discounts, and improving regional operations—the business can potentially increase annual profit by \$135K (47%) without dramatically increasing sales. This analysis proves that sustainable success requires measuring both revenue and profit margins together. The approach used here provides a practical framework for any business to uncover hidden profitability challenges and make smarter, data-driven decisions.