Retail Sales & Profit Analysis

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1. Executive Summary

This report analyzes historical retail sales data to understand key revenue trends, product performance, shipping efficiency, and the impact of discounts on profitability. Using a combination of **Python (Prophet for forecasting), Power BI (for visualization), and SQL (for data preparation and analysis)**, we explored sales trends across different customer segments, product categories, and time periods. Key insights include **exponential revenue growth projections, high profitability in Technology, inefficiencies in Furniture pricing, and optimal discount strategies**. Business recommendations include **refining discount policies, optimizing underperforming product categories, and improving shipping efficiency** to maximize profitability.

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2. Introduction

Problem Statement

Retail businesses need to understand their sales numbers, product performance, and customer segments to make data-driven decisions that drive revenue growth and profitability. This analysis identifies key revenue drivers, optimizes pricing and discount strategies, and evaluates shipping efficiency.

Importance of Analysis

- **Revenue Growth:** Identify trends to forecast future sales and plan for demand fluctuations
- **Profit Optimization:** Determine which products, discounts, and customer segments contribute most to profitability
- **Shipping Efficiency:** Optimize logistics to reduce delivery times and enhance customer satisfaction
- **Discount Analysis:** Determine optimal discounts ranges to maximize profit and revenue

Dataset Overview

- **Data Source:** Historical retail transactions
- **Size:** ~ 4 Years of data, 10,195 transactions
- **Key Variables:** Order/Ship Date, Revenue, Profit, Quantity, Discount, Product Category, Sub-Category, Customer Segment, Shipping Mode

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3. Data Preparation & Methodology

Data Cleaning & Preprocessing

- **Handled missing values** in product and customer details
- **Converted date columns** for accurate time-series analysis
- **Created new features** for revenue trends (Year, Quarter, Month breakdowns) and discount ranges

Tools & Techniques

- **SQL:** Data extraction, cleaning, and analysis
- **Python (Pandas, Prophet):** Time-series forecasting
- **Power BI:** Dashboard visualizations (Revenue Trends, Product Performance, Shipping Insights, Discount Ranges)

Assumptions & Limitations

- The dataset does not include specifics around costs for different shipping methods
- The dataset does not include advertising spend or external factors affecting sales
- Forecasting assumes consistent market conditions and no major disruptions in future years

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4. **Exploratory Data Analysis (EDA)**

Revenue Trends

- Revenue has shown **steady growth**, with **exponential increases from 2022-2024**
- Revenue growth projects to slow between **2024-2026,** but rebound strongly between **2026-2028**
- Peak sales occur in **September**, **November, and December**, while **January and February** are the slowest months

Product Performance

- **Technology** sector produces the highest revenue and profit margins
  - **Phones** generate the highest revenue
- **Furniture,** despite being the second highest in terms of revenue, has the lowest profit margins
  - **Tables and Bookcases** generate the lowest margins
- **Office Supplies** generate the least revenue but maintain strong profitability
  - **Paper** has the highest profit margin

Shipping Efficiency

- **60%** of orders use **Standard Shipping (5 days)**
- Faster options **(First Class, Second Class**) make up **33%** of shipments
- **Same-Day** shipping is underutilized, presenting an opportunity for increased adoption

Discount Impact

- **50%** of purchased products are discounted, with **Furniture** having the highest discount rate (**60%**)

- Optimal discount ranges: **11-20% (17,46% profit margin)**
- **21-40%** discount range generates strong revenue but leads to losses (**-16.73% profit margin**)
- Discounts above **40%** severely impact profit margins, leading to negative profitability

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5. Recommendations & Business Impact

Revenue Growth Strategy

- **Leverage peak sales months** (Sep, Nov-Dec) with targeted promotions and inventory planning
- **Prepare for forecasted growth in from 2026-2028** by optimizing supply chain operations

Product Strategy Adjustments

- **Prioritize Technology products,** especially **Phones and Copiers**, which drive high revenue and profitability
- **Re-evaluate Furniture pricing,** particularly **Tables and Bookcases**, to reduce losses
- **Expand marketing for Office Supplies,** focusing on high-margin products like Paper

Shipping Optimization

- **Encourage faster shipping options** (First and Second Class) to enhance delivery times
  - Further analyze cost (if data is available) of each shipping method to better understand the most cost-efficient method
- **Analyze costs for Standard Shipping,** as it dominates shipments but has the longest delays

Discounting Strategy Refinement

- **Maintain discounts within 11-20%** to sustain max profitability
- **Reduce excessive discounts (40%+),** as they lead to financial losses
- **Implement category-specific discounts:**
  - **Furniture** should have controlled discounting due to its lower profit margins
  - **Technology** discounts should target high-margin products like Copiers
  - **Office Supplies** discounts should be strategic to maintain healthy margins

Predictive Insights & Business Impact

- **Revenue is projected to grow significantly post-2026,** requiring the business to scale operations accordingly
- **Adjusting pricing and discounting strategies** could significantly improve profitability

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6. Conclusion & Next Steps

This analysis provides a data-driven approach to optimize revenue, profitability, and operational efficiency. Key takeaways include:

- **Sustained revenue growth with exponential increases expected after 2026**
- **Technology leads in profitability, while Furniture requires pricing adjustments**
- **Shipping can be improved, and further analyzed, to encourage faster delivery methods**
- **Discounts should be capped at 20% to prevent unnecessary losses**

Next Steps:

- **Conduct a customer segmentation analysis** to refine pricing and discount strategies
- **Optimize Furniture category costs or pricing** to prevent losses
- **Perform a cost-benefit analysis** of different shipping methods to balance speed and cost

Project 2