**Project 1**

**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.

1. **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

1. **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

1. **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

1. **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

1. **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**