Business Data Management

Capstone Project

(Final Report)

Title - ***Revitalizing Sales Strategy and Improving Inventory Management: A Business Data Management Project for Quadri Mobile Communication***

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Declaration Statement

I am working on a Project titled ***Revitalizing Sales Strategy and Improving Inventory Management: A Business Data Management Project for Quadri Mobile Communication***. I extend my appreciation to ***Quadri Mobile Communication*** for providing the necessary resources that enabled me to conduct my project.

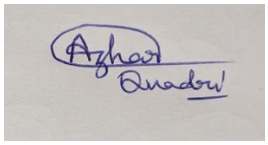
I hereby assert that the data presented and assessed in this project report is genuine and precise to the utmost extent of my knowledge and capabilities. The data has been gathered from primary sources and carefully analyzed to assure its reliability.

Additionally, I affirm that all procedures employed for the purpose of data collection and analysis have been duly explained in this report. The outcomes and inferences derived from the data are an accurate depiction of the findings acquired through thorough analytical procedures.

I am dedicated to adhering to the principles of academic honesty and integrity, and I am receptive to any additional examination or validation of the data contained in this project report.

I understand that the execution of this project is intended for individual completion and is not to be undertaken collectively. I thus affirm that I am not engaged in any form of collaboration with other individuals, and that all the work undertaken has been solely conducted by me. In the event that plagiarism is detected in the report at any stage of the project's completion, I am fully aware and prepared to accept disciplinary measures imposed by the relevant authority.

I understand that all recommendations made in this project report are within the context of the academic project taken up towards course fulfillment in the BS Degree Program offered by IIT Madras. The institution does not endorse any of the claims or comments.



Signature of Candidate:

Name: Azhar Quadri

Date: 9th Nov 2024

1. Executive Summary

This comprehensive report analyzes Quadri Mobile Communication's sales performance, inventory management, customer preferences, and financial efficiency. The findings aim to uncover strategies for driving sustainable growth and profitability in the mobile communications market.

The sales analysis reveals that premium models, like the VIVO T1 5G, have driven revenue growth, while high-volume products like the Samsung Guru 1200 offer lower profit margins. Brand analysis shows that Xiaomi and Realme have disrupted the market with affordable, feature-rich devices, while Samsung maintains a diverse presence across both Smartphones and FeaturePhones.

The inventory management assessment highlights the need for demand-driven planning and more sophisticated forecasting to address stock-outs and overstocking issues. Customer preference analysis indicates strong demand for blue-colored devices and mid-range specifications, informing product offerings.

Financial trends analysis shows overall revenue growth, with fixed costs like rent and salaries dominating the expense structure. Revenue peaks on Saturdays, suggesting opportunities for targeted promotional activities and weekend-focused marketing campaigns.

In conclusion, the report outlines key opportunities for Quadri to optimize inventory planning, target high-margin products, and align offerings with evolving customer preferences to strengthen its market position and enhance operational efficiency.

2. Detailed Explanation of Analysis Process/Method

The analysis process followed a structured approach to uncover valuable insights into Quadri Mobile Communication’s sales performance, inventory efficiency, and customer preferences. It began with a crucial step - data cleaning and structuring. Each step aimed to ensure data accuracy, enable meaningful comparisons across products, and provide clear visuals for patterns and trends which was essential for reliable findings.

- **Data Cleaning and Preparation**

  The foundation of accurate analysis is clean and well-prepared data. This crucial step in the data analysis process ensures consistency, removes inaccuracies, and allows for reliable

comparisons across datasets. Without a thorough data preparation phase, will lead to flawed and unreliable insights and conclusions.

- **Standardization**: Standardizing the data is a crucial aspect of data preparation. For instance, product names and brand entries need to be standardized to address variations in how they are recorded. If "Samsung Galaxy A12" and "Galaxy A12" both refers to the same product, but if left unaddressed, these inconsistencies could lead to fragmented sales or inventory records, resulting in inaccurate analysis.

  By unifying the naming conventions, the dataset provides a clear, consolidated view of sales and inventory trends, enabling more meaningful and trustworthy insights.

- **Handling Missing Values and Duplicates**: Ensuring the accuracy and integrity of your data is a critical step in the analysis process. Handling missing values and duplicate entries is essential to maintaining reliable results. For example, gaps in critical fields like product specifications can be filled with the most common values within relevant categories, such as smartphones. This preserves the dataset's integrity while minimizing biases caused by incomplete information.

  Similarly, identifying and removing duplicate entries can prevent artificially inflated sales or inventory figures, ensuring the accuracy of calculated metrics like total revenue and inventory turnover.

• Strategic Segmentation and Categorization

Segmenting the data into meaningful groups provided targeted insights into customer behavior, brand preferences, and product demand, enabling a more focused and detailed analysis.

- **Product Segmentation by Category**: Products were divided into two primary categories: *SmartPhones* and *FeaturePhones*. These categories enabled a focused understanding of market dynamics and customer preferences across different price ranges and functionalities.

  This segmentation highlighted the dominance of budget-friendly FeaturePhones like Samsung Guru 1200, helping prioritize stocking decisions.

- **Brand and Model Grouping**: Sales and inventory data were collected and grouped by brand and model, allowing for a detailed analysis of brand performance

  This approach identified top-performing brands (e.g., Xiaomi and Realme) and underperforming ones, guiding for strategic decisions about product stocking and marketing efforts.

- ## Key Metrics Calculation

  Calculating relevant metrics provided a deeper understanding of product performance, inventory efficiency, and profitability.

  - **Inventory Turnover**:

    Calculated as *Sales Quantity / Quantity Purchased*, this metric measured how quickly products moved through inventory. High-turnover items like Samsung Galaxy A12 highlighted popular models requiring frequent restocking, while low-turnover items suggested overstock issues.

    This metric was critical for optimizing inventory management and avoiding tied-up capital in slow-moving products. Other metrics, such as total revenue alone, would not capture the efficiency of inventory movement or highlight profitability.

  - **Profit Margin Analysis**:

    Derived as *Selling Price - Purchase Cost*, profit margins identified products that generated the highest returns.

    Items like Samsung Guru 1200, despite their high sales volume, had average profit margins, while some low-demand models yielded higher margins. This insight guided pricing adjustments and promotional efforts.

  Metrics like inventory turnover and profit margins provided a holistic view of operational efficiency. They went beyond surface-level insights like total revenue to uncover areas for strategic improvement, such as restocking policies and pricing strategies.

- ## Analytical Tools

  A diverse range of tools was used to analyze, visualize, and interpret the data effectively.

  - **Excel**:

    Excel served as the starting point for organizing and cleaning the datasets. Its user-friendly interface allowed for quick transformations, such as identifying and removing duplicates, and creating pivot tables to summarize sales trends.

    It was also used to compute basic statistics like total revenue, sales volumes, and inventory costs.

  - **Python**:

Python enabled advanced analysis and custom visualizations. Libraries like pandas, matplotlib, and seaborn facilitated statistical computations, such as correlation analysis between price and sales volume, and scatter plots for inventory stock-out trends.

Python's flexibility allowed for the creation of complex metrics and visualizations that were tailored to the shop's unique needs, such as profit margin heatmaps or clustering analyses of customer preferences.

- **Tableau:**

  Tableau was essential for creating interactive visualizations and dashboards. It allowed for dynamic exploration of trends, such as sales by category, brand performance, and inventory turnover.

  Examples include bar charts for top-selling models and pie charts for brand market shares. Tableau's interactivity made it easy to filter and drill down into specific aspects of the data, providing actionable insights for stakeholders.

This multi-step approach, combining data cleaning, segmentation, targeted metrics, and diverse tools enabled a detailed exploration of Quadri Mobile Communication's challenges and opportunities, paving the way for actionable recommendations that addresses sales, inventory, and customer needs effectively.

Datasets and Analysis links : https://shorturl.at/xIlOq

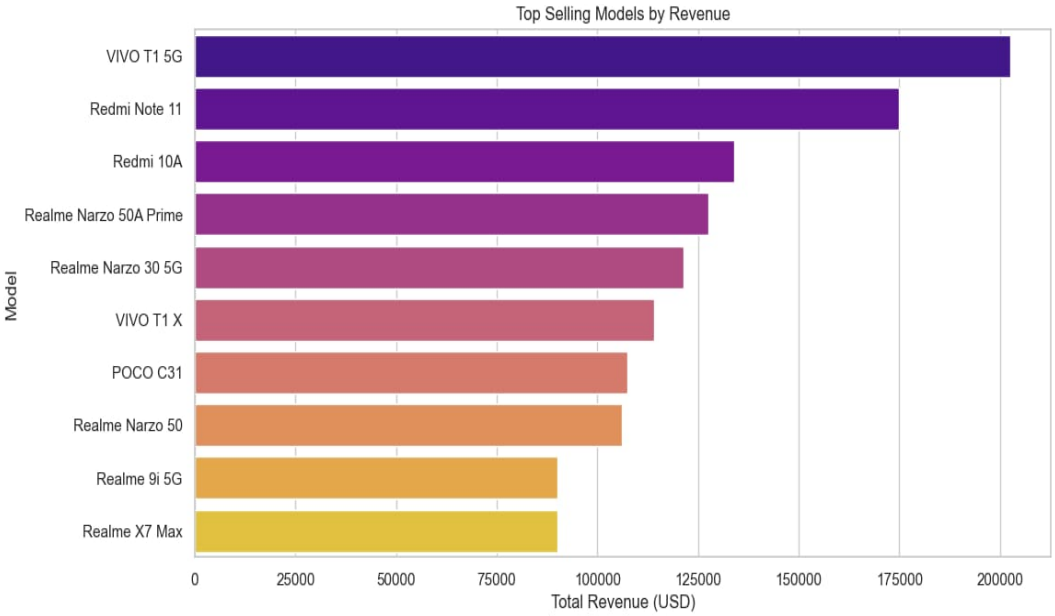
3. Results and Findings

3.1 Sales Performance Analysis

The first step involves grouping the sales data by **Brand** and **Model** to identify top-performing products. Calculate total revenue for each model to determine the revenue leaders. Similarly, compute sales volume to identify the most popular products by units sold.

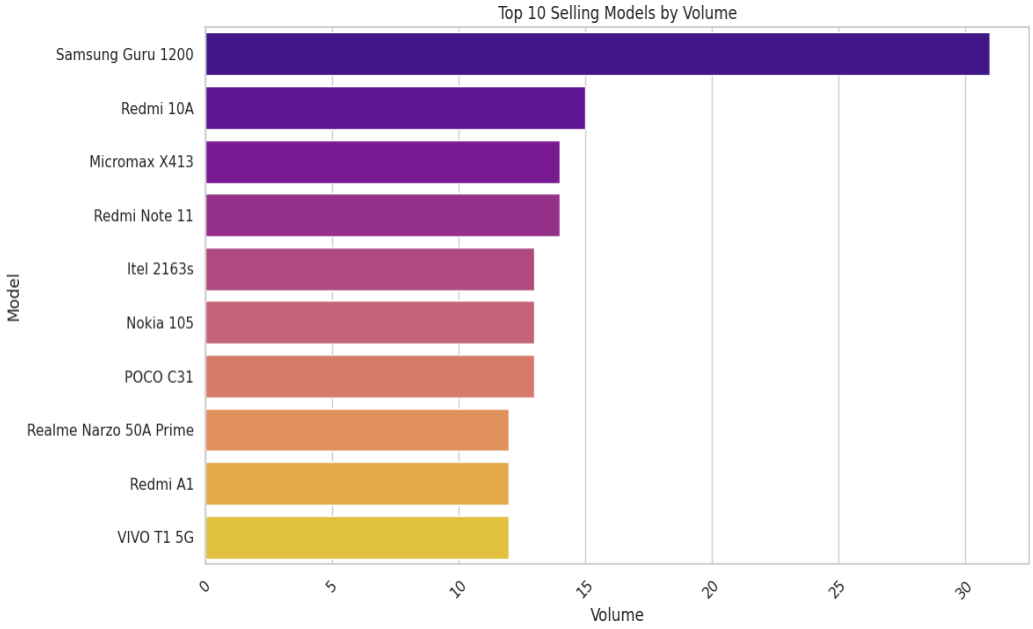
- **Top-Selling Products**:
  - **Methodology:** Sales data was grouped by Model, and total revenue and sales volume were calculated for each product. A Pareto analysis revealed that the top 20% of products does not accounted for approximately 80% of the total revenue.
  - **Visualization:** Bar chart showing the top 10 products by revenue and volume, providing a clear view of the revenue and volume leaders and the pareto analysis chart.

i. Top 10 Selling Models by Revenue



Findings: VIVO T1 5G is the highest selling model by revenue

ii. Top 10 Selling Models By Volume

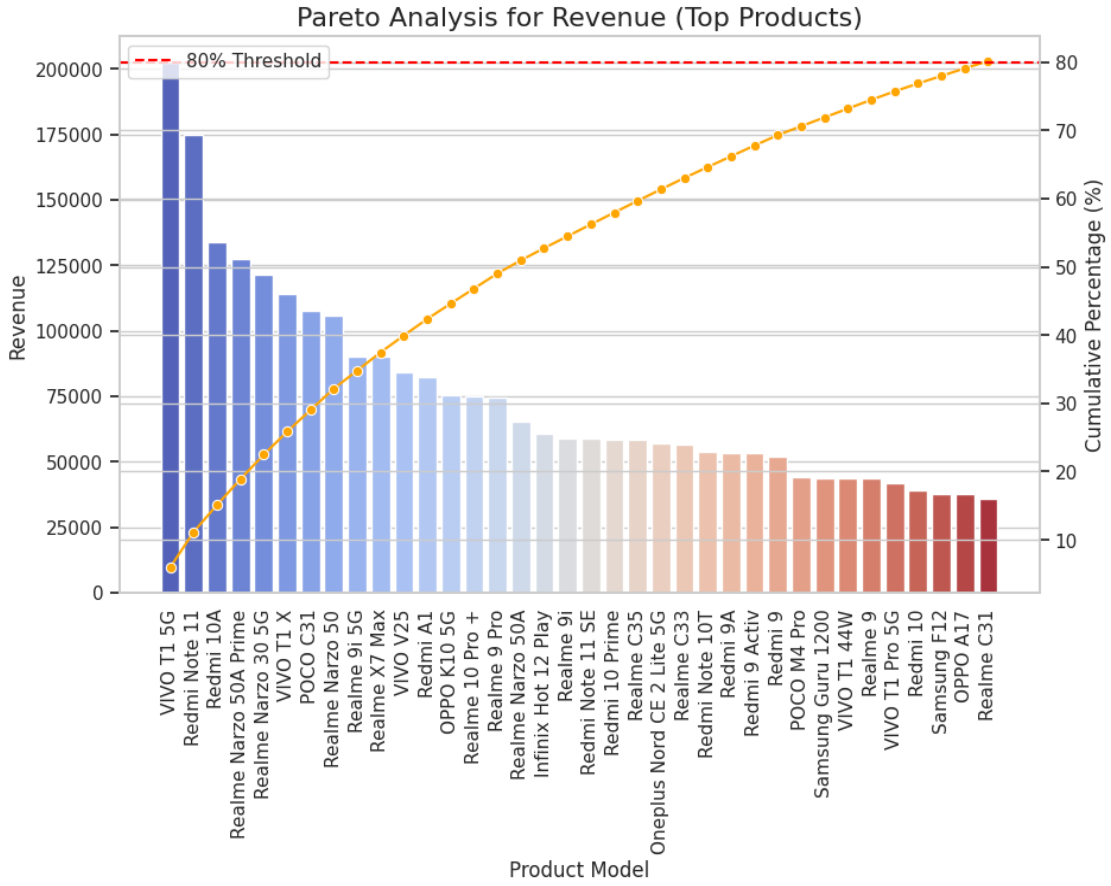


Findings: Samsung Guru is the highest selling model by volume

iii. Pareto Analysis

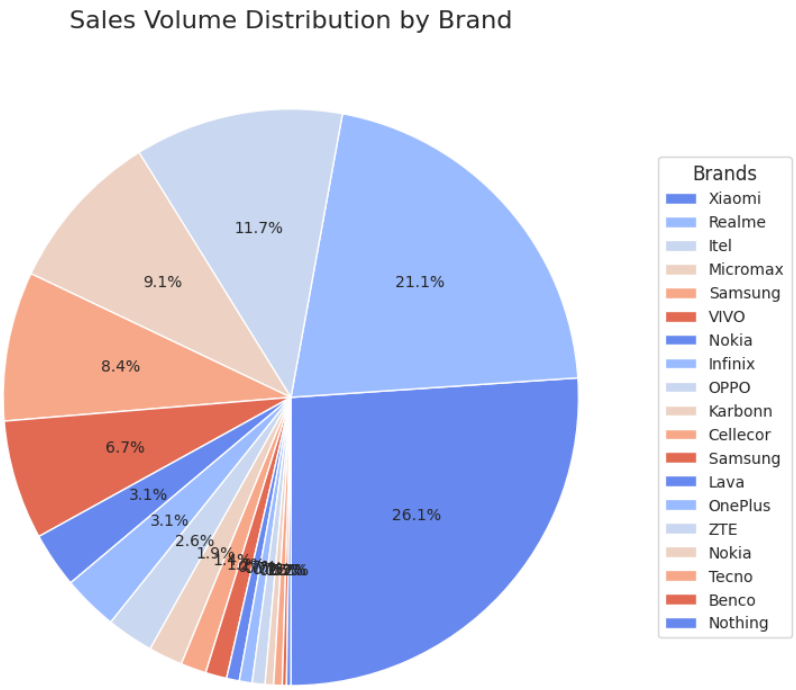
Visualising this below chart we can say that in this case, the *80% revenue threshold* is reached only after considering the *36th product* out of *91 total products*. This means approximately *40% of products* contribute to *80% of total revenue* instead of the expected *20%.*

Unlike typical sales patterns where a few products dominate, the revenue here is more evenly distributed across a larger number of products. Top-performing products like *VIVO T1 5G* and *Redmi Note 11* lead the revenue, but mid-performing products also play a significant role.



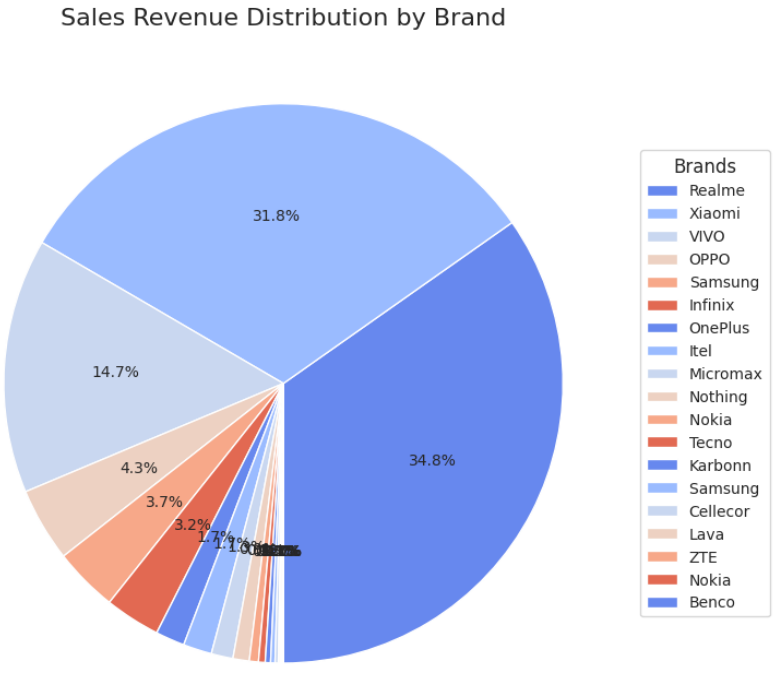
- **Brand Analysis**:
  - **Methodology:** Sales data was grouped by Brand, and the percentage contribution of each brand to the total sales volume was calculated.
  - **Visualization:** A pie chart was created to illustrate the sales distribution by brand, while additional analysis provided insights into sales distribution by category and brand.

I. Pie chart (Sales Volume by Brands).



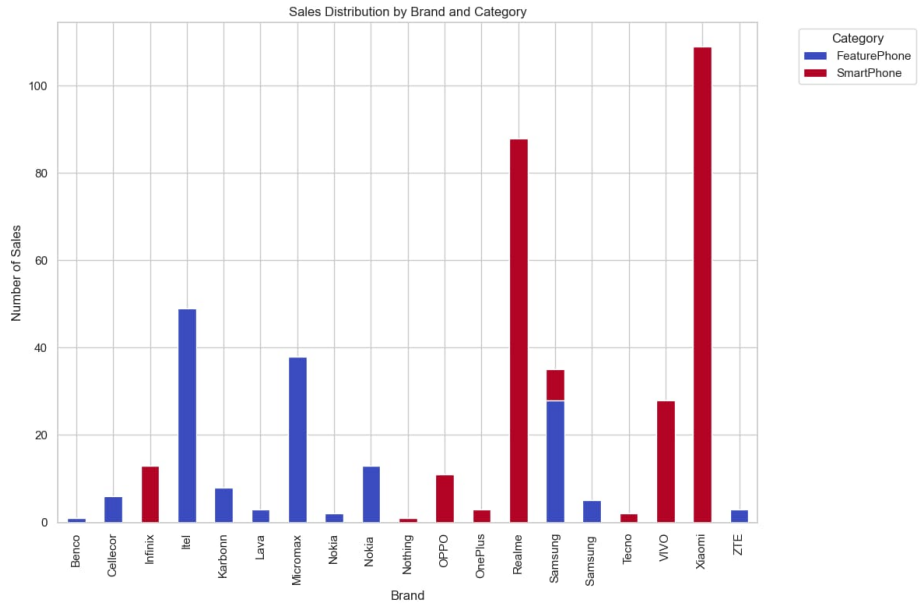
Findings: Xiaomi and Realme collectively dominate the market, accounting for over 45% of the total sales volume.

II. Pie Chart (Sales Revenue by Brands)



Findings: Realme and Xiaomi collectively dominates in market, accounting for over 65% of total sales revenue.

III. Sales Distribution by Brand and Category



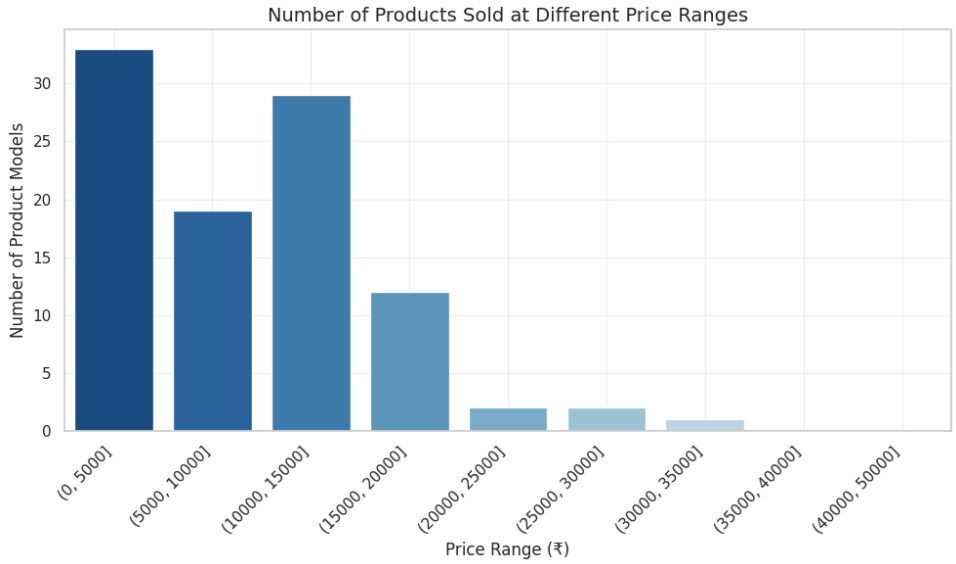
Findings: We can visualise that Big Brands like Realme and Xiaomi mostly dominates the Smartphone Category while Samsung have diverse market of featurephone as well as Smartphone. Some Indian Brands also have market due to their low prices like Itel and Micromax.

3.2 Pricing and Profitability Insights

Understanding the relationship between pricing, sales performance, and profitability is essential to make data-driven decisions for product pricing strategies and inventory prioritization. This section examines price sensitivity among customers and analyzes product-level profit margins to identify trends that can guide business strategies.

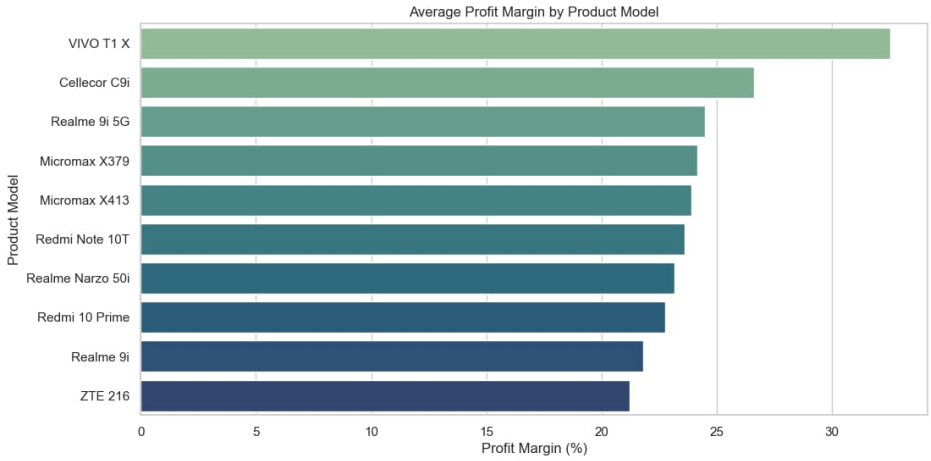
- **Price Sensitivity**:
  The analysis involved plotting the product price ranges (X-axis) against the quantity sold (Y-axis) to visually assess the relationship between price and sales volume.

  - **Visualization:** A barplot was generated to visualise the most selling price ranges.



Findings: Most of the products are sold in budget segment. As the price range increases the volume sold decreases.

- **Profit Margins**:
  - **Visualization:** Average profit margin by Product Model



Findings: Certain low-demand models have higher margins, whereas high-demand items like Samsung Guru 1200 have average margins.

3.3 Inventory Management Insights

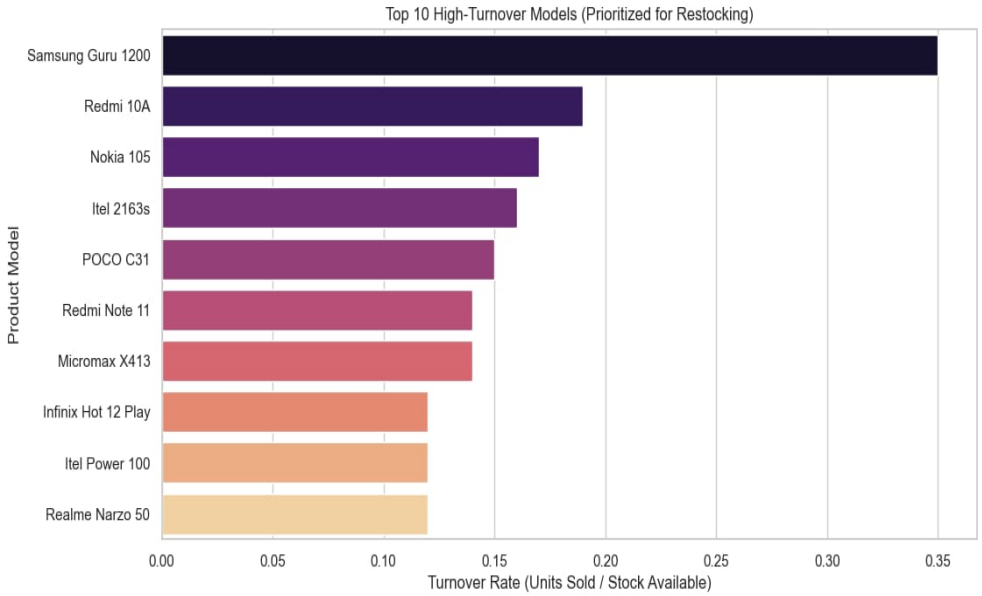
Effective inventory management is crucial for optimizing stock levels and ensuring product availability. The analysis focuses on identifying turnover rates, stock-out occurrences, and overstock trends to improve overall inventory efficiency.

- **Inventory Turnover**:

  Inventory turnover was analyzed using sales and purchase data. Total units sold per model were determined from sales data, while total units purchased served as a proxy for stock levels. These datasets were merged, and turnover rate was calculated by dividing units sold by units purchased. The top 10 models with the

highest turnover rates were visualized, highlighting products prioritized for restocking.

- **Visualization:** Turnover rates displayed in a bar chart, with high-turnover models prioritized for restocking.

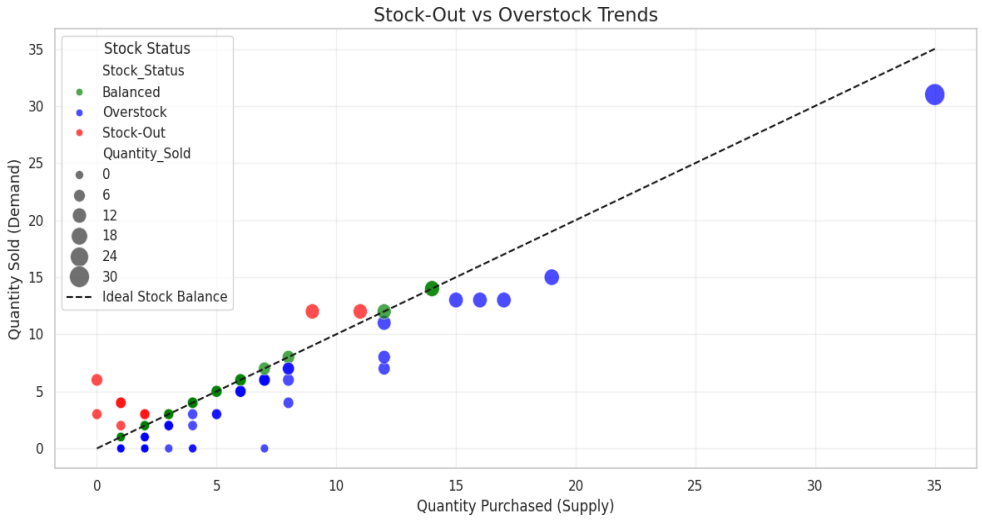


Finding: High turnover in popular models like Samsung Galaxy A12, while low turnover for certain Vivo models suggests potential overstock.

- **Stock-Out and Overstock Trends**:

This analysis provides actionable insights into inventory inefficiencies, highlighting the need for demand-based inventory planning to reduce stock-outs and minimize overstock, ultimately improving profitability and customer satisfaction.

- **Visualization:** Scatter plot comparing quantity sold and quantity purchased, identifying under- and over-stocked items.

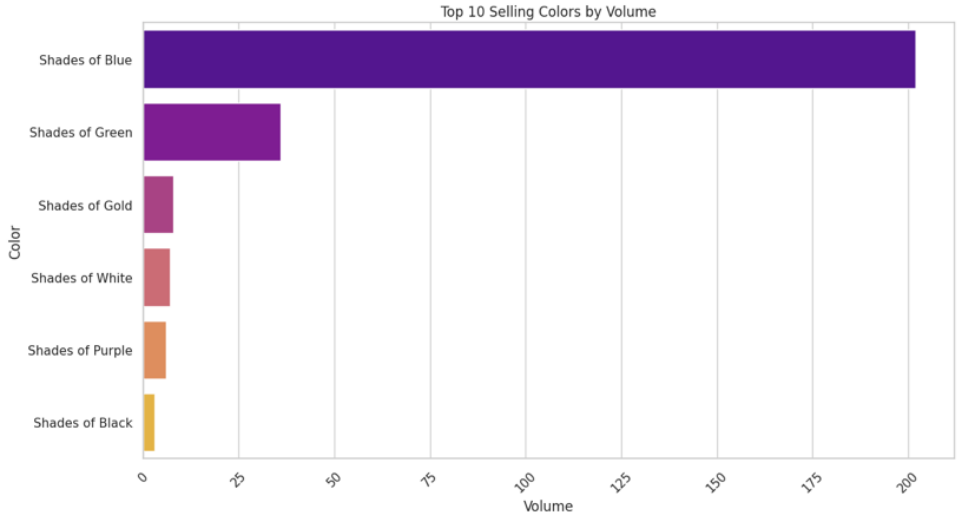


Finding: Frequent stock-outs in high-demand models and overstock in low-demand models indicate a need for improved inventory management.

3.4 Customer Preferences

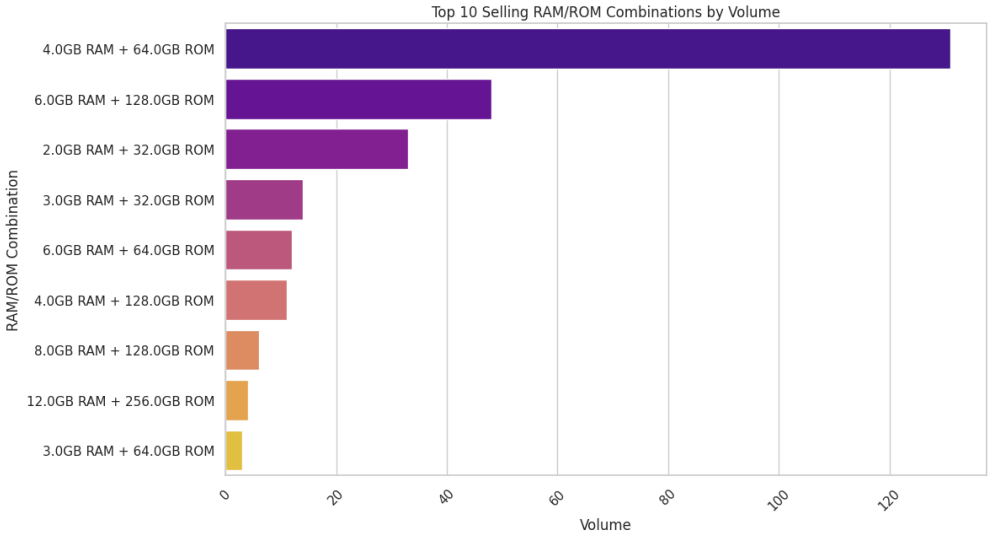
Understanding customer preferences is essential for aligning product offerings with market demand. This analysis focuses on identifying the most preferred ***colors*** and ***RAM/ROM combinations*** based on sales volume.

- **Preferred Specifications**:
  - **Top Selling Products by Color**



Findings: Shades of Blue are the most sold color among all colors.

  - **Top Selling RAM and ROM Combination**



Findings: 4GB RAM and 64GB ROM is the most sold combination by volume.

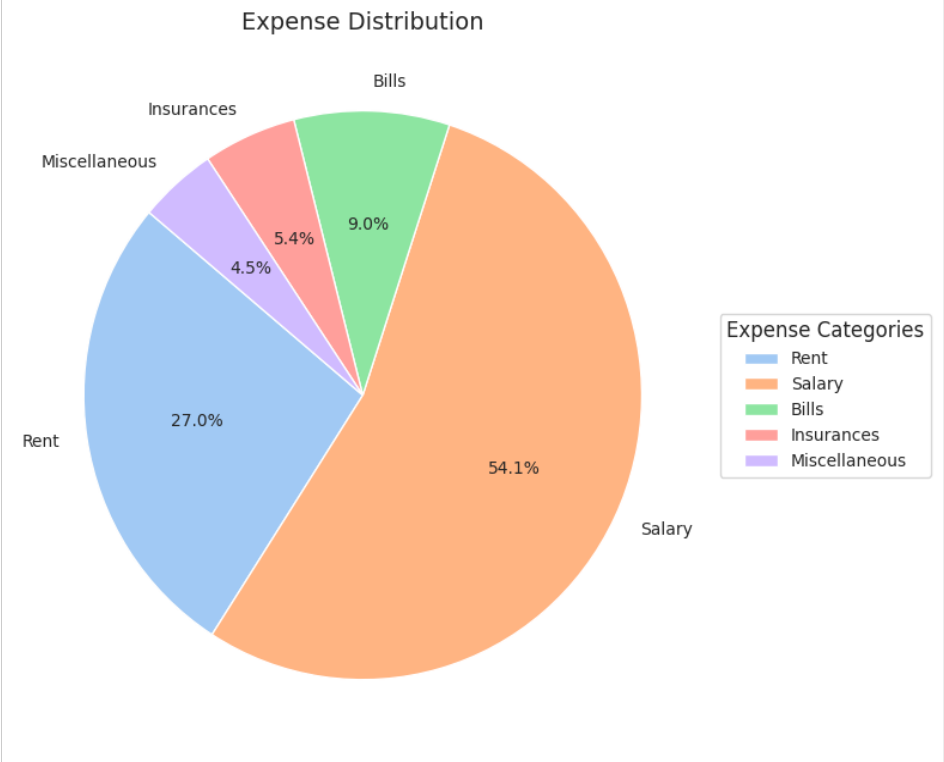
3.5 Finance Analysis

Comprehensive understanding of expense distribution is essential for managing operating costs effectively, analyzing the shop's expenses, focusing on identifying major fixed costs and areas for potential optimization.

- **Cost Distribution**:

  Expense data was analysed by aggregating monthly expense categories (e.g., rent, salary, utilities)and the percentage contribution of each category to the total expenses was calculated.

  - **Visualization:** Pie chart showing the breakdown of expenses.

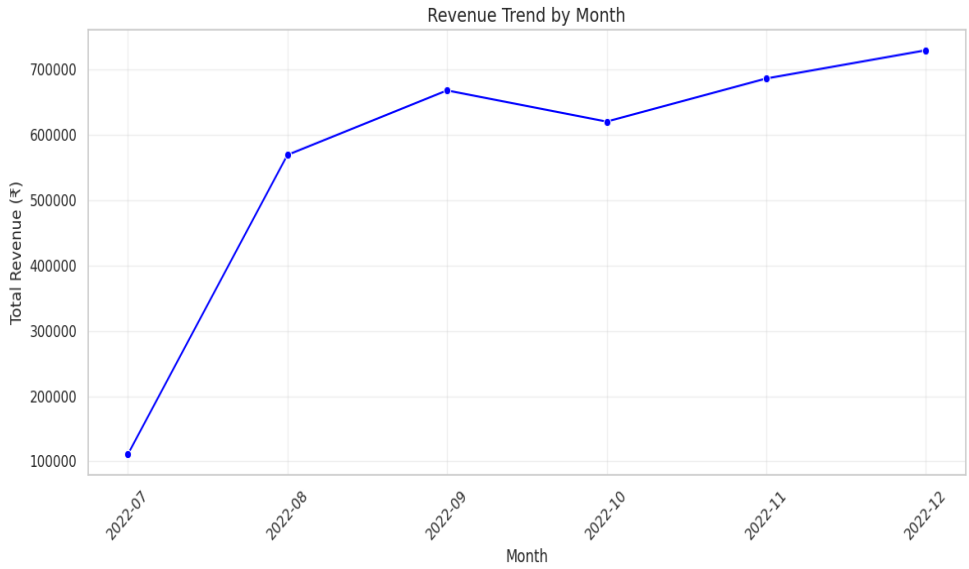


  - **Finding:** Rent and Salary form the majority of monthly expenses, representing significant fixed costs.

- **Revenue Trend by Month:**

  Aggregated the revenue by month to visualize how revenue changes over time.

  - **Visualisations:**

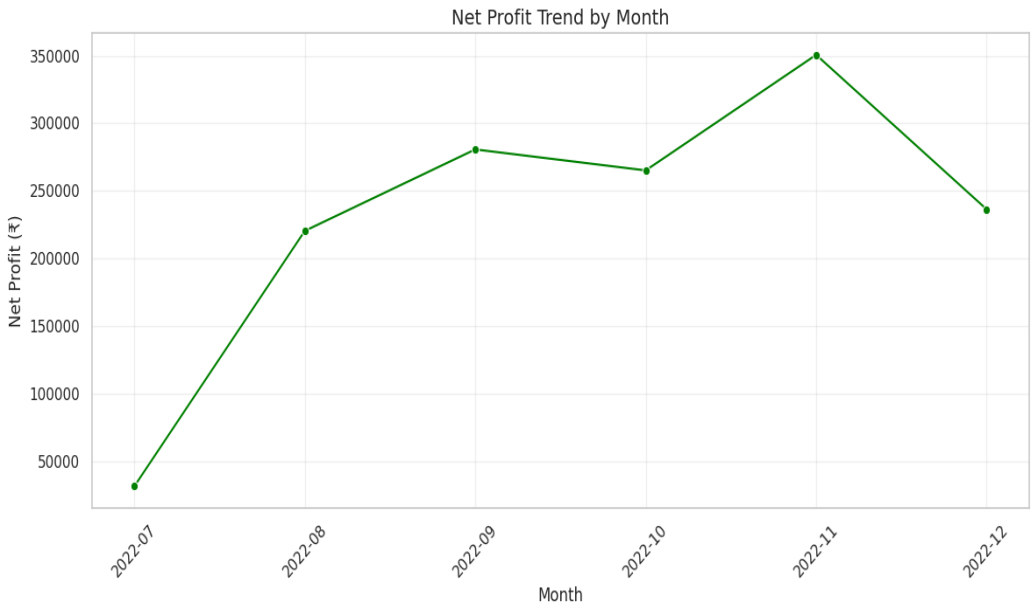


Findings: We can visualise that revenue is in up trend except for the october month.

- **Profit Trend by Month:**

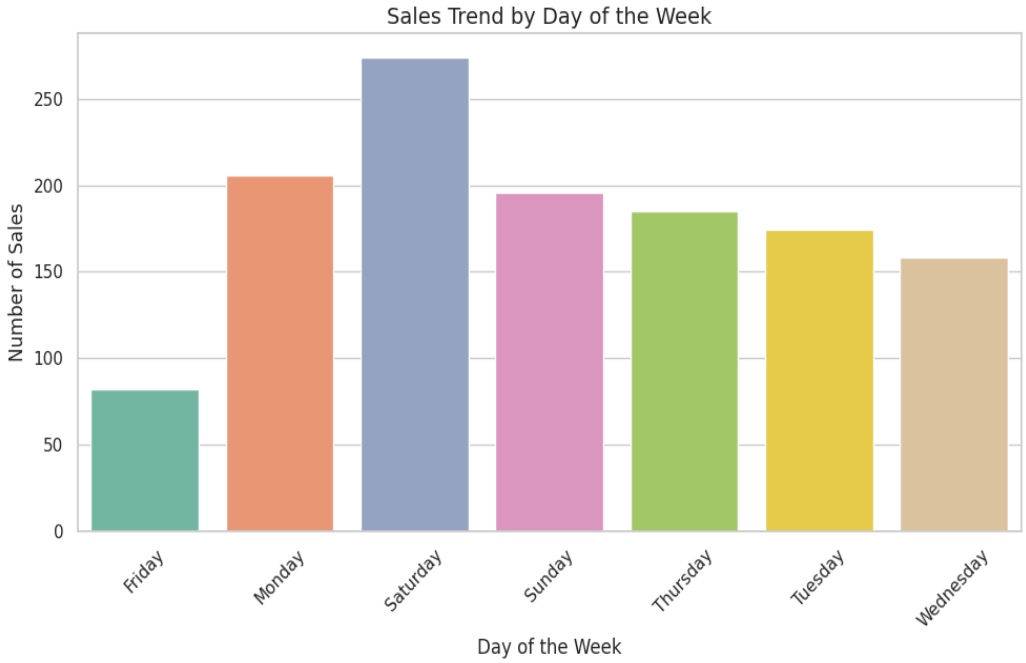
Identified months with the lowest profit and analyze reasons. This helps assess how profitable the business is over time, adjusting for cost changes.

- **Visualisations:**



- **Sales Trend by Day of the Week**

Calculated the number of sales that happen on each day of the week.



Findings: We can visualise that Saturday was the day when most of the sales happened (in volume).

4. Interpretation of Results and Recommendation

- **Sales Insights**

  - High-volume products like the **Samsung Guru 1200** remain crucial for maintaining sales momentum but provide moderate margins. Strategic pricing or bundling options can further optimize returns on these products.
  - Top-performing products such as **VIVO T1 5G** significantly contribute to revenue, indicating the importance of balancing both high-value and high-volume offerings to maximize profitability.
  - **Pareto findings** suggest revenue is more evenly distributed across products than expected. This requires focusing not only on top-performing products but also ensuring adequate support for mid-tier performers.

- **Inventory Insights**

  - High inventory turnover for models like the **Samsung Galaxy A12** underscores their popularity and the need for frequent restocking to avoid missed sales.
  - Overstock in underperforming Vivo models highlights opportunities for markdowns or alternative sales strategies to free up capital.

- Frequent **stock-outs** on high-demand products demonstrate the need for a **demand-driven inventory system**, ensuring popular products are prioritized for replenishment.

- **Customer Preferences**

  - The dominance of **blue** phones suggests aligning product variety with color demand.
  - The most popular **4GB RAM/64GB ROM** configuration highlights customer preference for mid-range specifications. This information can guide purchasing decisions and promotional strategies for similar models.

- **Pricing and Profitibality**

  The budget segment drives the majority of sales, emphasizing price sensitivity among customers. While high-volume products sustain cash flow, models with higher margins (even if low-demand) offer profitability opportunities. Analyzing price elasticity can help adjust pricing strategies to balance volume and margin.

- **Financial and Operational Trends**

  - High fixed costs like **rent** and **salary** represent significant operational expenses. Exploring cost optimization strategies or revenue-boosting initiatives can improve profit margins.
  - Revenue trends are positive but exhibit seasonal dips (e.g., October), requiring further examination of external factors (e.g., festivals, economic conditions).
  - Peak sales on **Saturdays** offer a prime opportunity for targeted promotions and discounts to maximize revenue during weekends.

Recommendations

i. **Improve Inventory Management**

Restock popular models like **Samsung Guru 1200** to avoid stock-outs and reduce overstock of slow-moving products.

ii. **Boost Sales with Promotions**

Offer discounts or special deals on **Saturdays** to increase sales during peak days.

iii. **Focus on High-Profit Products**

Promote products with higher profit margins and adjust pricing for high-demand models like **Samsung Guru 1200**.

iv. **Stock What Customers Prefer**

Keep more **blue-colored phones** and models with **4GB RAM/64GB ROM** as they are the most popular choices

v. **Reduce Costs and Monitor Performance**

Find ways to save on fixed costs like **rent** and **salary**, and use tools like **Excel and Tableau Dashboard** to regularly track sales and expenses. Also suggested to use some sort of PoS(Point of Sale) Software to track and maintain their inventory as well as Finances.