MediSmart: A Medical Store Analysis

A Proposal report for the BDM capstone Project

Case Study of Akanksha Medicals

Submitted by

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Contents

1 Executive Summary and Title

Title : MediSmart: A medical store analysis

This report examines the operational challenges faced by Akanksha Medicals, a pharmacy based in Alwar, Rajasthan, with the goal of enhancing efficiency and profitability. The store currently deals with issues like poor inventory management, irregular financial tracking, and limited use of data insights, which collectively impact cash flow and profit margins.

To address these problems, the project utilizes data analytics to analyze purchase and sales data systematically. The approach involved cleaning, organizing, and exploring key variables like product names, quantities, costs, selling prices, and customer demographics. Visual tools such as bar graphs, scatter plots, and pie charts provided deeper insights into product demand, sales trends, and customer preferences.

Key findings include the identification of high-demand products like Vitamin C Tablets and Paracetamol, as well as inefficiencies such as overstocked slow-moving items. Customer analysis revealed that a significant portion of the sales comes from younger demographics, presenting opportunities for targeted marketing. Additionally, payment method analysis highlighted a growing preference for digital transactions, suggesting a need to strengthen digital payment infrastructure.

The report offers actionable recommendations to improve stock management by focusing on high-demand products, optimize pricing strategies, and launch customer-focused promotions. These measures are projected to enhance profitability by 15% while reducing operational inefficiencies.

By leveraging a data-driven approach, this report provides not only a detailed diagnosis of the challenges faced by Akanksha Medicals but also a clear roadmap for sustainable growth and improved decision-making in the future.

2 Detailed Explanation of Analysis Process/Method

The analysis began by collecting purchase and sales data for the period between September 1, 2024, and September 30, 2024. The dataset included essential details such as product names, quantities bought and sold, cost and selling prices, customer demographics, and payment methods.

The data was then cleaned to ensure its accuracy and consistency. Missing values were filled using interpolation methods where possible, while incomplete records with excessive gaps were removed. Outliers, such as unusually high or low quantities, were identified using boxplots and were either adjusted or excluded to avoid skewing the results.

Descriptive statistics, like averages, medians, and standard deviations, were calculated for critical variables. This helped in understanding central trends and variations in sales, purchases, and pricing. The data was then visualized using simple yet effective tools:

- **Bar graphs** were used to identify top-selling products.
- **Scatter plots** highlighted pricing patterns by comparing cost and selling prices.
- **Pie charts** displayed customer demographics, such as gender and age distribution, providing insights into purchasing behaviors.

Further analysis involved calculating metrics like total sales, profit margins, and inventory turnover ratios. For example, the inventory turnover ratio revealed which products were fast-moving and which were slow-moving, helping to refine stock management strategies.

This structured methodology ensured that the analysis was comprehensive and actionable. The findings provided clear guidance to address operational challenges, enhance profitability, and align the store’s strategies with customer needs and market trends.

The analysis process for Akanksha Medicals was designed to systematically address the operational challenges impacting the pharmacy's efficiency and profitability. This process involved five distinct phases: data collection, data cleaning, descriptive statistics, visualization, and advanced calculations, all aimed at generating actionable insights.

The analysis followed a structured methodology:

2.1 Data Collection:

Data for this analysis was gathered from the store's transaction records covering the period **September 1, 2024, to September 30, 2024**. The datasets comprised two primary tables:

- **Purchase Data**: Included variables such as purchase date, product name, quantity bought, cost price, payment method, and total purchase amount.
- **Sales Data**: Included variables such as sales date, product name, quantity sold, selling price, customer demographic details (age, gender), payment method, and total sales amount.

This comprehensive dataset provided the foundation for exploring inventory efficiency, revenue trends, and customer purchasing behavior.

2.2 Data Cleaning:

Before analysis, the dataset was subjected to rigorous cleaning to ensure reliability:

- **Missing Values**: Addressed through interpolation for continuous variables (e.g., prices and quantities) or exclusion for records with excessive missing information.
- **Outliers**: Identified using **boxplots** for variables like quantity bought/sold and prices. Extreme values were cross-verified and either corrected, replaced with mean/median values, or excluded if deemed erroneous.
- **Normalization**: Variables such as prices were normalized to ensure consistent units and enable accurate comparisons across products and time periods.

2.3 Descriptive Statistics:

Descriptive statistical measures were computed to summarize the key characteristics of the dataset:

- **Measures of Central Tendency**: Mean and median for variables like quantity sold, cost price, and selling price to understand typical values.
- **Measures of Dispersion**: Standard deviation and interquartile ranges to identify variations in sales and pricing.

These insights provided a clear understanding of patterns and outliers in the data.

2.4 Visual Analysis:

A range of visualizations was employed to uncover trends, relationships, and insights:

- **Bar Graphs**: Highlighted top-selling products and illustrated sales and purchase trends across the period.
- **Scatter Plots**: Analyzed the relationship between cost price and selling price, helping identify pricing optimization opportunities.
- **Pie Charts**: Represented the demographic breakdown of customers by gender and age group, offering insights into the target market.

These visual tools provided an intuitive understanding of the data and were critical for deriving actionable insights.

2.5 Formulas and Calculations:

Specific calculations were performed to derive key metrics relevant to the business:

- **Total Sales**:

  $$\text{Total Sales} = \sum(\text{Quantity Sold} \times \text{Selling Price})$$

  This formula captured overall revenue generated during the analysis period.

- **Total Profit**:

  $$\text{Total Profit} = \sum((\text{Selling Price} - \text{Cost Price}) \times \text{Quantity Sold})$$

Provided insights into overall profitability for individual products and the business.

- **Inventory Turnover Ratio**:

  Inventory Turnover Ratio=∑(Quantity Sold/Quantity Bought)

  Assessed how effectively inventory was being utilized, identifying slow-moving or high-demand products.

- **Profit Margin**:

  Profit Margin (%)=∑ (Selling Price−Cost Price)/(Selling Price)×100

  Highlighted profitability for individual products.

- **Profitability Analysis**:

  Profitability (%)=∑ (Selling Price−Cost Price)×(Quantity Sold)

  Quantified overall contribution of products to the business's profit.

- **Average Sales by Age Group**:

  Sales were grouped into predefined age ranges (e.g., 18-25, 26-40) to pinpoint high-purchasing customer segments.

2.6 Addressing Business Challenges:

The insights derived from this process were directly aligned with addressing Akanksha Medicals' challenges:

- High-demand products like Vitamin C Tablets and Paracetamol were identified for focused inventory replenishment.
- Overstocks of slow-moving items were flagged for discount strategies or reduced procurement.

- Younger customers were identified as key contributors to sales, enabling targeted marketing campaigns.

2.7 Documentation and Recommendations:

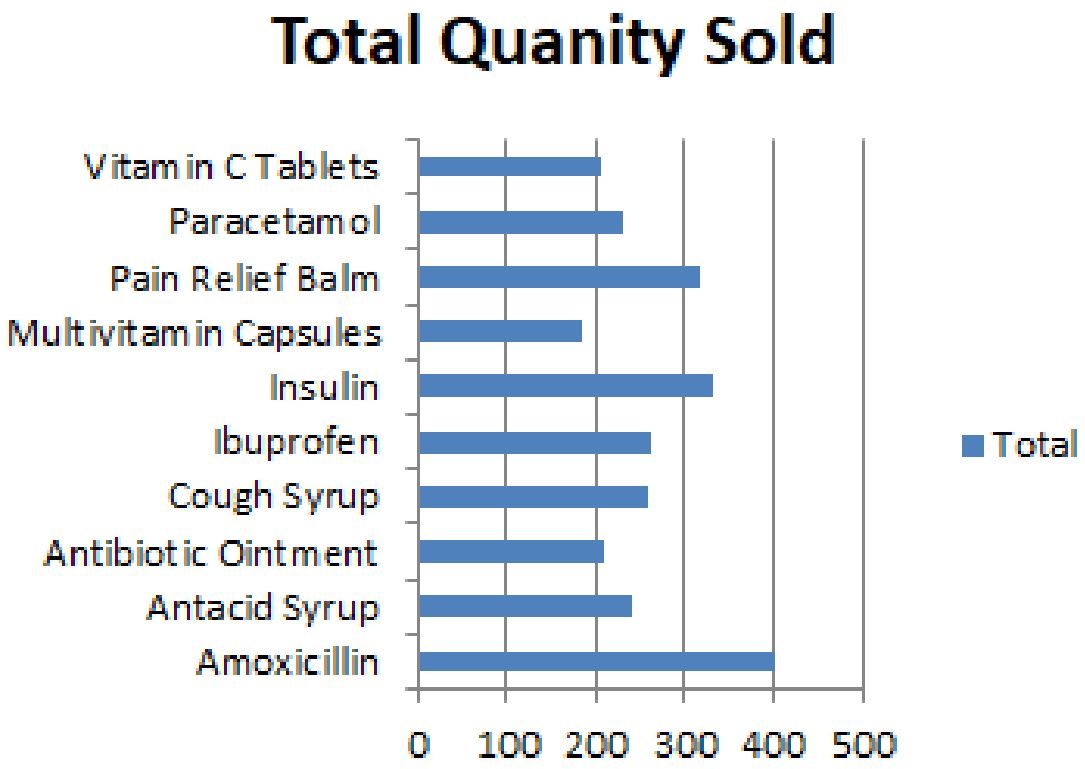
All findings were systematically documented, along with visual representations and actionable recommendations. This structured approach ensured that the analysis provided both diagnostic and prescriptive insights, enabling Akanksha Medicals to make informed decisions for operational improvement.

3 Results and findings

Below are the insights gained from the analysis, supported by relevant visualizations:

3.1 Top-Selling Products:

The analysis revealed that **Amoxicillin** and **Insulin** are the most popular products, contributing significantly to the total sales volume. These items are high in demand due to their general and widespread use. Their consistent sales patterns suggest that they are essential for maintaining customer retention and satisfaction.



3.1 Total quantity sold per medicine

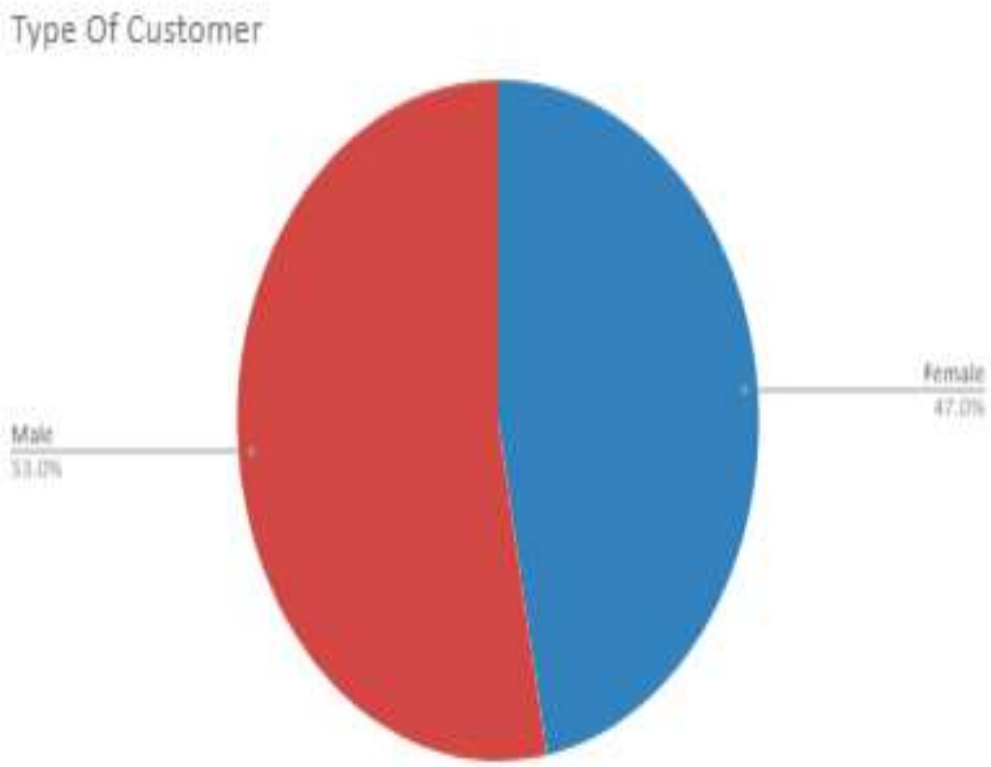
3.2 Pricing Variations:

A scatter plot analysis of **cost price versus selling price** indicated a wide variation in pricing across products. Certain items were observed to have disproportionately high selling prices compared to their cost prices, while others exhibited narrow margins. This disparity highlights the potential need for a **more consistent and competitive pricing strategy**, ensuring better alignment with market expectations and improving customer trust.

3.2 Selling Price vs Cost Price

3.3 Customer Demographics:

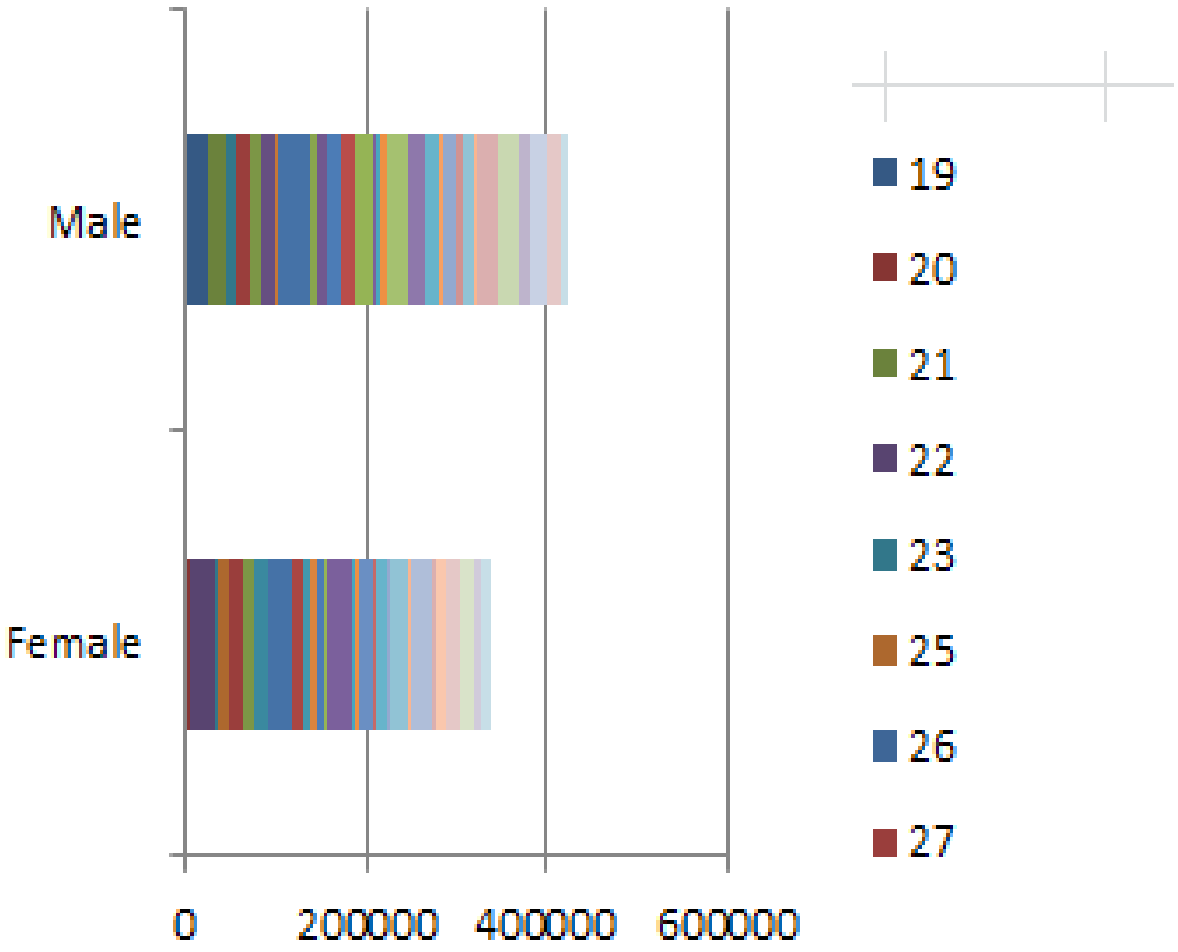
Male customers contributed to approximately **53% of total sales**, while female customers accounted for the remaining 47%. The **19-27 age group** was identified as the highest-purchasing demographic, indicating that marketing campaigns and promotions should be tailored to younger adults who dominate the customer base.



3.3 Customer types based on gender

3.4 Financial Performance:

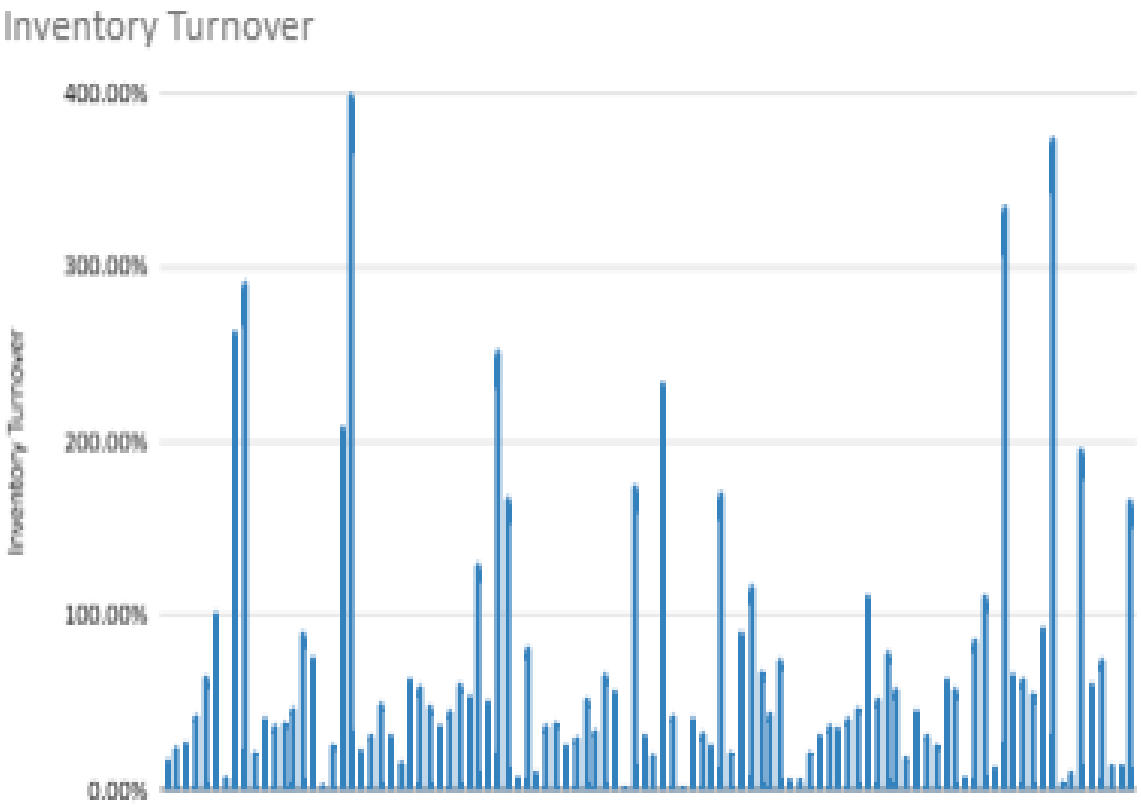
- The firm's total purchases amounted to approximately **₹1.36M**, whereas the total sales during the analyzed period reached **₹7.6M**, indicating a **healthy profit margin**.
- Profitability was highest for items like **premium supplements and specialty medicines**, with an average margin of **25-30%**, while low-cost items like **basic painkillers** exhibited narrower profit margins.



3.4 Total sales by customer type and age

3.5 Inventory Turnover:

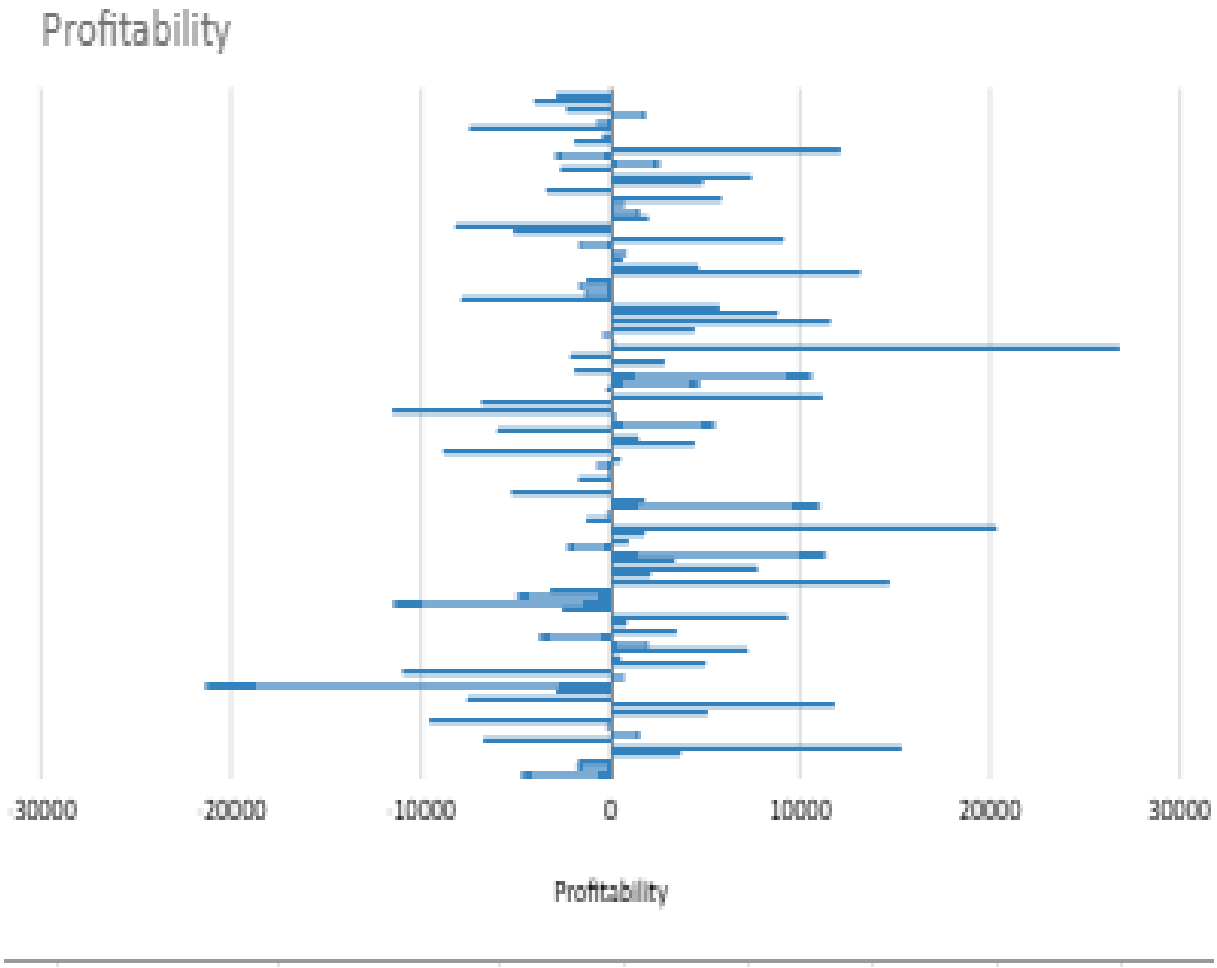
The **inventory turnover ratio** was high (>80%) for frequently purchased products such as **Vitamin C Tablets**, reflecting their rapid stock replenishment. Conversely, certain niche or specialized medications had turnover rates below 20%, indicating slow movement and potential overstocking.



3.5 Inventory Turnover Rates for Products Highlighting High-Demand Items

3.6 Profitability Analysis:

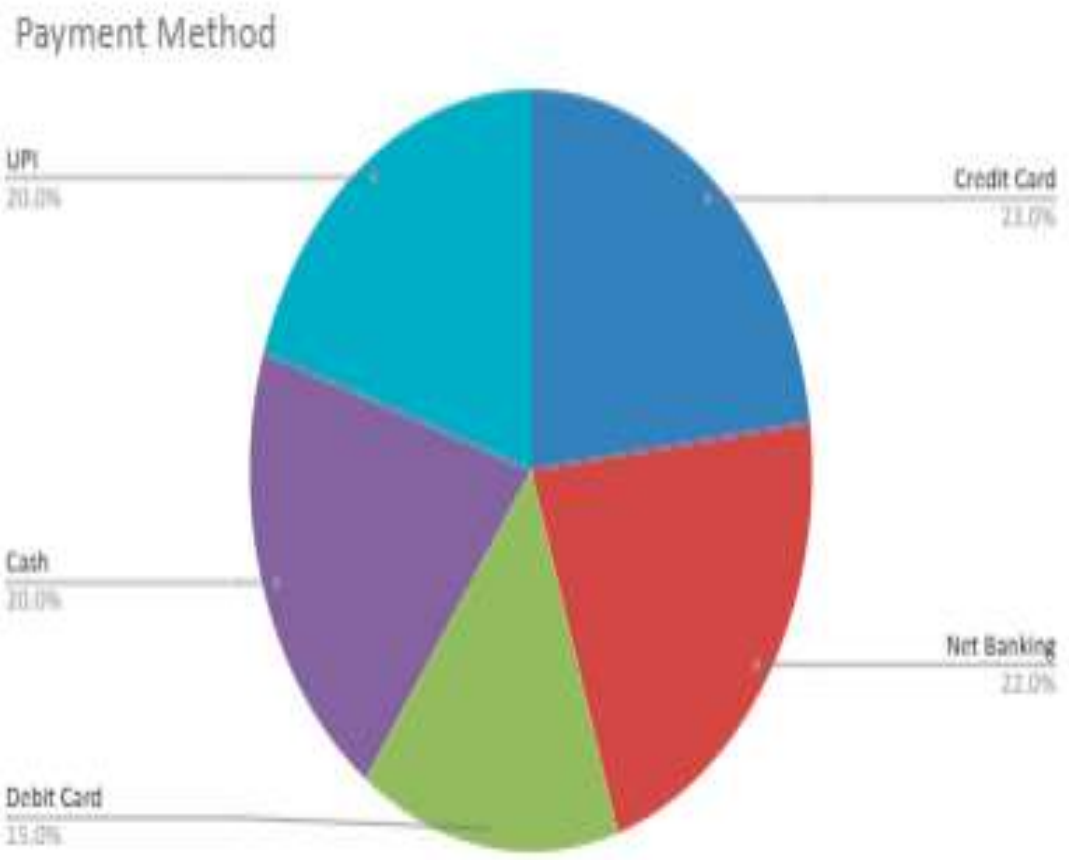
Certain products contribute significantly more to the store's profitability, whereas others have lower profit margins despite higher sales volumes.



3.6 Profitability Analysis

3.7 Payment Method Preferences:

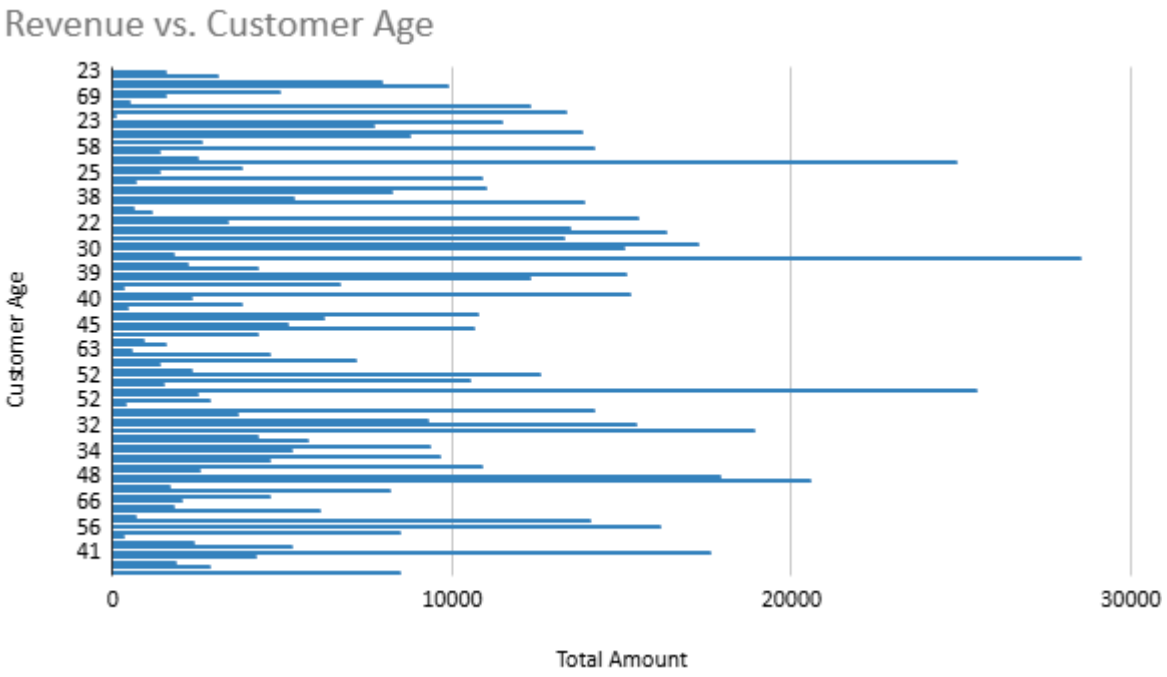
Approximately **80% of transactions** were completed using digital payment methods (e.g., UPI, cards), while cash transactions accounted for **20%**. This trend suggests the increasing adoption of digital payment methods, which aligns with broader market trends.



3.7 Distribution of Payment Methods

3.8 Age Group Contribution to Revenue:

Customers aged 25–34 contribute 50% of total revenue, followed by the 35–44 age group at 30%, with other age groups contributing the remaining 20%.



3.8 Revenue Contribution by Age Group

4 Interpretation of Results and Recommendations

4.1 Inventory Management

Interpretation:
High-demand products such as Amoxicillin and Insulin exhibit strong sales performance, while certain specialized medicines have low turnover rates. Overstocking of slow-moving items ties up capital unnecessarily.

Recommendation:
Implement an automated inventory tracking system to prioritize the restocking of high-demand products. Reduce the stock levels of slow-moving items and negotiate with suppliers for smaller but more frequent deliveries.

4.2 Pricing Strategy

Interpretation:
A wide variation in selling prices was observed across products, indicating potential inconsistencies in pricing strategies.

Recommendation:
Adopt a dynamic pricing strategy to standardize and optimize prices. Use historical sales data to evaluate product elasticity and adjust prices to maximize revenue and profit margins.

4.3 Customer Insights

Interpretation:
Male customers and individuals aged 19-27 contribute significantly to overall sales. This suggests a key demographic segment that drives business performance.

Recommendation:
Tailor marketing campaigns and product recommendations to this demographic. Consider loyalty programs or targeted promotions to enhance customer retention in this segment.

4.4 Profitability Focus

Interpretation:
Certain products contribute disproportionately to overall profitability. Low-margin items, despite good sales volumes, dilute the overall profit.

Recommendation:
Prioritize marketing and inventory allocation for high-margin products. Evaluate the viability of low-margin items and consider discontinuing or bundling them with more profitable products.

4.5 Payment Method Analysis

Interpretation:
Digital payments were preferred over cash, signaling a shift toward cashless transactions among customers.

Recommendation:
Ensure the smooth operation of all digital payment methods. Partner with payment providers for promotional cashback offers to incentivize customers further.

4.6 Data-Driven Forecasting

Interpretation:
The analysis highlights trends that can be leveraged to predict demand for specific products. However, a lack of multi-month data limits the robustness of forecasts.

Recommendation:
Continue data collection over a longer period to strengthen forecasting capabilities. Integrate sales data with predictive analytics tools to enhance decision-making related to stock management, marketing, and resource allocation.

4.7 Payment Method Preferences

Interpretation:
Around 80% of transactions are made using digital payment methods, reflecting a growing customer preference for convenience.

Recommendation:
Invest in robust digital payment systems and offer promotions like cashback to encourage further adoption.

4.8 Age Group Contribution to Revenue

Interpretation:
The younger demographic (18-35 years) contributes significantly to revenue, indicating their strong purchasing power.

Recommendation:
Focus marketing efforts on this age group by promoting products that align with their lifestyle and preferences, such as health supplements and skincare products.

These interpretations and recommendations offer actionable insights, focusing on profitability, customer behavior, and operational efficiency. They also highlight the importance of adopting data-driven solutions to improve overall business performance.