# Sustaining a Small Kirana Store:
# Tackling Inventory and Profit Challenges

## Mid-term Report for the BDM Capstone Project

Submitted by:

Name: Irina Agastin

Roll no: 23F2004169

IITM BS Degree Program,

Indian Institute of Technology, Madras

Chennai, Tamil Nadu, India, 600036

# TABLE OF CONTENTS

## 1. EXECUTIVE SUMMARY

Kochuparambil Stores, established by Mrs. Shaila Ansari's father-in-law 20 years ago, is a small Kirana store in Kottayam, Kerala. The store sells food and dairy products, snacks, vegetables, flour, toiletries etc. It was a profitable business in its early days with little competition to hinder it and plenty of products to sell. Unfortunately, after the founder's death, the business began to stagnate. Encouraged by her neighbors and relatives, Mrs. Shaila took over the ownership and management of the shop in 2010. After stepping in as the new owner, she struggled initially as she was unaware of the market trends but later on got help from her husband and brothers. She still faces many challenges, including uncertain customer demand, low-profit returns, and competition from neighboring Kirana shops. This project will analyze the operations of the store and suggest ways to enhance profitability and efficiency. Both the sales and purchase data for 3 months were collected directly from the owner in both handwritten and bill formats.

The midterm report identifies trends such as:

1. Revenue comparison across different days, and categories
2. Products with the highest profit margins
3. Daily and monthly revenue trend
4. Customer payment distribution

This analysis reveals that very few items earn most of the revenue and profits, hence indicating a need for better inventory practices and pricing strategies. This interim report provides a basis on which the final submission will be used for conducting inventory analysis and suggesting actionable recommendations for Kochuparambil Stores to stay competitive and ensure sustainable growth.

## 2. PROOF OF ORIGINALITY OF THE DATA

Shop :     Kochuparambil stores

Owner :   Shaila Ansari

Contact:   +91 81389 54666

Address:  Kochuparambil stores , Ammancherry, Perumbaikad,

Kottayam, Kerala  ( Thellakom PO:686630 )

Image 1- the store's front view

**Interaction video with the owner and extended view of the shop:**
🎬 bdm project interaction video.mp4

**Sales and purchase Data Link:**
📗 Kochuparambil Sales and purchase data.xlsx

**More images from the shop:**
📕 Kochuparambil stores images (2).pdf

**Letter from the organization:**
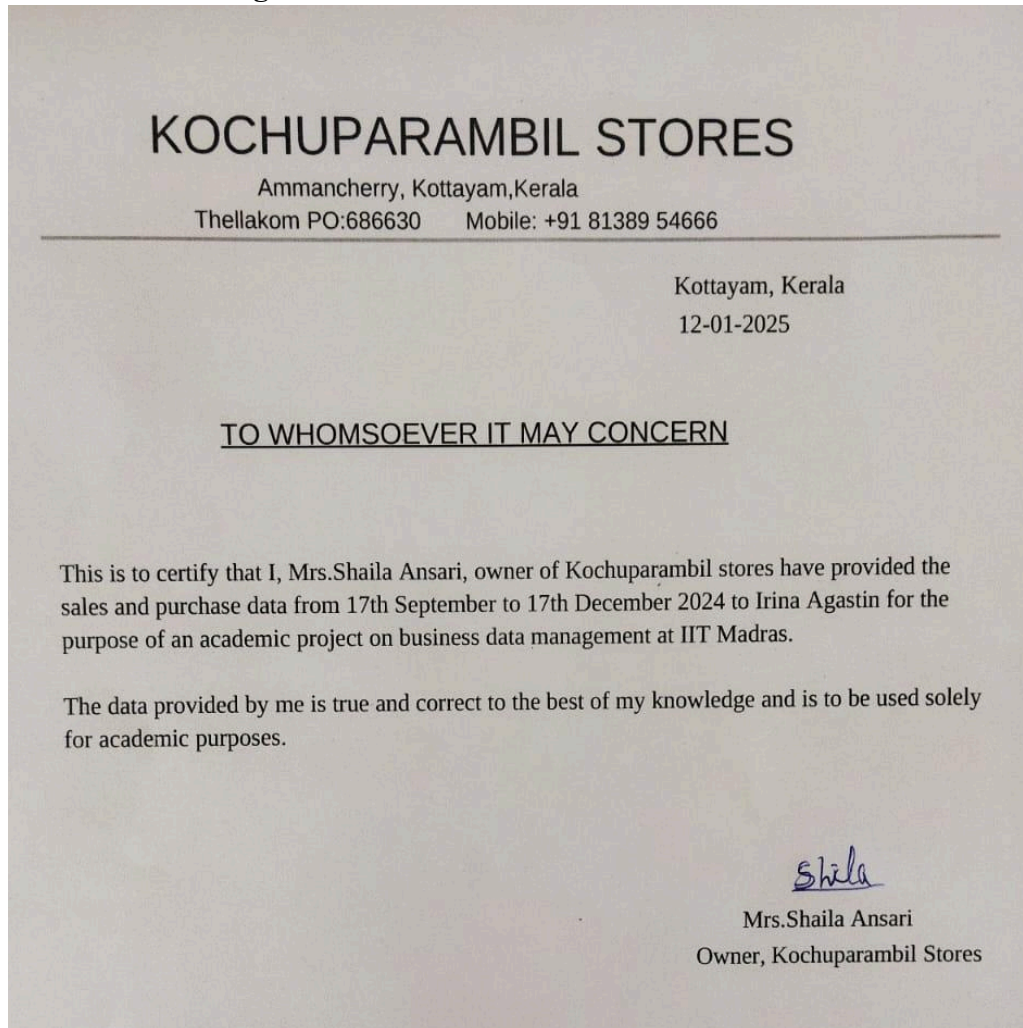


Image 2- Letter from the owner giving academic access to business data

## 3.1 METADATA

The sales and purchase data from September 17, 2024, to December 17, 2024 (3 months) was collected directly from the store owner. The originally received unstructured data had the following columns: Item Name, Quantity, Amount, and Date.

**i ) Purchase Data:**

The purchase bills were collected in different forms from the shop owner- one from a wholesale store named Dhanesh Stores and the other as an itemized list, including quantity and price, provided by the vegetable vendor.

| Image 3 -Dhanesh stores purchase bill | Image 4- purchased vegetable list |

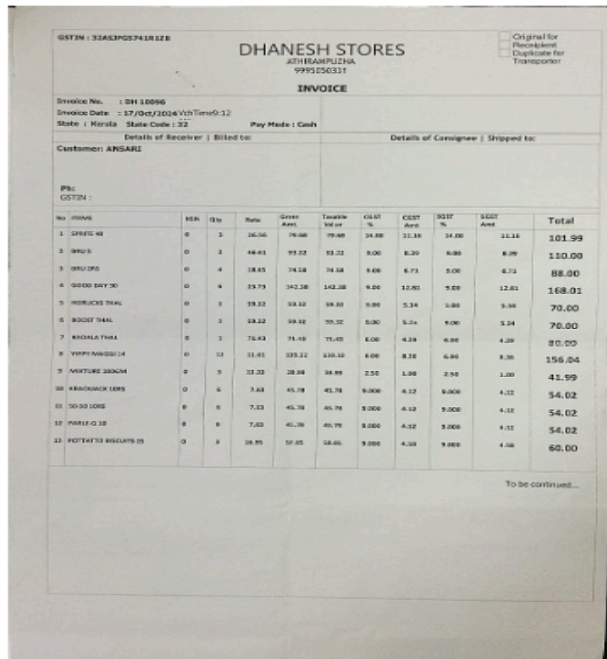| No | Item name | Quantity | Rate | Gross Amount | Category | Purchase Date |
|---|---|---|---|---|---|---|
| 1 | atta | 5 | 51.70 | 305.03 | Flour and Grains | 09/13/2024 |
| 2 | coriander powder | 10 | 14.29 | 150.00 | Spices and Masalas | 09/13/2024 |
| 3 | chilly powder | 10 | 16.67 | 175.00 | Spices and Masalas | 09/13/2024 |
| 4 | rice powder | 6 | 21.43 | 144.01 | Flour and Grains | 09/13/2024 |
| 5 | turmeric powder | 5 | 28.10 | 147.53 | Spices and Masalas | 09/13/2024 |
| 6 | kashmiri chilly powder | 5 | 47.62 | 250.00 | Spices and Masalas | 09/13/2024 |
| 7 | ujala | 4 | 41.53 | 196.02 | Cleaning Products | 09/13/2024 |

Table 1-Structured purchase data

Column descriptions (NV-numerical variable, CV-categorical variable, NoV-nominal variable):

1. No (NoV): Sequential numbering for each item row

2. Item name(NV): Name of the product or item being purchased/listed

3. Quantity(NV): Number of units for each item

4. Rate (NV): Price per unit in Indian Rupees

5. Gross Amount (NV): Total cost (Quantity × Rate) in Indian Rupees

6. Category(CV): Product classification by grouping of 128 items into 14 distinct categories

7. Purchase Date(CV): Date of purchase, shown as MM/DD/YYYY format

## ii) Sales Data:

The owner recorded daily sales data in Malayalam, keeping separate books for non-credit (daily summaries) and credit customers (monthly summaries for each customer).

Image 5- daily noncredit customer data      Image 6- monthly credit customer data

| No | Item name | Quantity | Selling price | Amount | Category | Date | Day | Customer | Payment mode | Month no. | Cost Price | Profit | margin(%) |
|----|-----------|----------|---------------|--------|----------|------|-----|----------|--------------|-----------|------------|--------|-----------|
| 1 | tea powder | 1 | 10 | 10 | Beverages | 09/17/2024 | Tuesday | Random | Non Credit | 1 | 8.10 | 1.90 | 19.00 |
| 2 | ponds powder | 1 | 10 | 10 | Hygiene and Toiletries | 09/17/2024 | Tuesday | Random | Non Credit | 1 | 7.84 | 2.16 | 21.60 |
| 3 | egg | 6 | 7 | 42 | Dairy | 09/17/2024 | Tuesday | Random | Non Credit | 1 | 6.00 | 6.00 | 14.29 |
| 4 | milk | 4 | 28 | 504 | Dairy | 09/17/2024 | Tuesday | Random | Non Credit | 1 | 26.00 | 8.00 | 7.14 |
| 5 | peanut pkt | 2 | 10 | 20 | Snacks and Chips | 09/17/2024 | Tuesday | Random | Non Credit | 1 | 6.25 | 7.50 | 37.50 |
| 6 | water | 1 | 20 | 20 | Beverages | 09/17/2024 | Tuesday | Random | Non Credit | 1 | 12.00 | 8.00 | 40.00 |
| 7 | milk | 2 | 28 | 56 | Dairy | 09/17/2024 | Tuesday | Villa 3 | Credit | 1 | 26.00 | 4.00 | 7.14 |
| 8 | milk | 1 | 28 | 28 | Dairy | 09/17/2024 | Tuesday | Villa 5 | Credit | 1 | 26.00 | 2.00 | 7.14 |
| 9 | onion | 0.35 | 66 | 23.1 | Vegetables | 09/17/2024 | Tuesday | Villa 5 | Credit | 1 | 55.00 | 3.85 | 16.67 |

Table 2- The structured sales data

Column descriptions (NV-numerical variable, CV-categorical variable, NoV-nominal variable):

1. No(NoV): Sequential numbering for each item row

2. Item name(CV): Name of the product or item being purchased

3. Quantity(NV): Number of units for each item

4. Rate(NV): Price per unit in Indian Rupees

5. Amount(NV): Total transaction value (Quantity × Rate) in Indian Rupees

6. Category(CV): Product classification by grouping of 128 items into 14 distinct categories

7. Date(CV): Date of transaction, shown as MM/DD/YYYY format

8. Day(CV): Day of the week

9. Customer(CV): Identifiers for credit customers and "Random" for non-credit customers

10. Payment Mode(CV): Payment method classification: Credit and Non-Credit

11. Month No(CV):Dividing the days into 3 months, from September 17th to December 17th.

12. Cost Price(NV): Purchase cost per unit

13. Profit(NV): Calculated as (Selling price - Cost Price)× Quantity

14. Margin(NV): Profit margin percentage = (Selling price - Cost price / Selling price) ×100

## 3.2 DESCRIPTIVE STATISTICS

| MEASURE | # Quantity | # Selling price | # Amount | # Cost Price | # Profit | # margin |
|---|---|---|---|---|---|---|
| Average | 1.83 | 36.15 | 38.47 | 29.91 | 5.82 | 17.73 |
| Mode | 1.00 | 28.00 | 28.00 | 26.00 | 2.00 | 7.14 |
| Median | 1.00 | 28.00 | 28.00 | 26.00 | 4.00 | 14.29 |
| Standard Deviation | 2.20 | 43.90 | 30.62 | 37.39 | 6.91 | 13.63 |
| Minimum | 0.05 | 1.00 | 2.00 | 0.79 | 0.02 | 0.20 |
| Maximum | 30.00 | 420.00 | 315.00 | 356.00 | 145.00 | 96.05 |
| 25th Quartile | 1.00 | 18.00 | 20.00 | 11.61 | 2.00 | 7.14 |
| 75th Quartile | 2.00 | 35.00 | 56.00 | 28.50 | 7.50 | 22.50 |
| TOTAL | 4824.60 | 95357.00 | 101491.60 | 78906.47 | 15357.22 | 46763.21 |

Table 3

Table 3 provides key insights into financial metrics such as **quantity, selling price, amount, cost price, profit, and margin**. It includes summary statistics like **average** for central tendency, **mode & median** for frequent and middle values, and **standard deviation** for variability. The **minimum & maximum** indicate observed extremes, while the **25th & 75th quartiles** show data distribution. The **total** represents the overall sum of each metric across transactions. These statistics help analyze business performance, identify trends, and assess sales and profitability variability.

## 4. DETAILED EXPLANATION OF ANALYSIS PROCESS

Three months' worth of data, from September 17 to December 17, 2024, was collected in written format, then converted into a structured format in Google Sheets, and thoroughly cleaned, organized, and analyzed. The data preprocessing steps included correcting typing errors in item names or quantities, sorting data by the date of purchase or transaction, and handling missing values by either asking the owner for clarification or filling in the empty values with the mean selling price or quantity of certain items. Outliers were removed if the selling price or quantity was significantly higher or lower than the usual range, based on past transaction data. For example, during Diwali, a rare bulk purchase of lamp wicks worth ₹550 was removed.

To ensure efficient analysis, additional columns like Category, Day, Customer, Payment Mode, Month No., Profit (Rs), and Margin have been added. The structured and processed sales dataset has 2,638 rows and 14 columns, of which 6 are numerical, 7 are categorical, and 1 is a nominal variable used for uniquely identifying each row. Meanwhile, the purchase dataset has 918 rows

and 7 columns, of which 4 are numerical, 2 are categorical, and 1 is a nominal variable for indexing/serialization.These columns enable detailed analysis of product performance, customer preferences, payment patterns, and revenue trend tracking over time, helping identify profitable areas and optimize business strategies.

Below are the computed values or fields created to facilitate better comparison and analysis:
- Profit(Rs) = (Selling price - Cost price) * Quantity
- Margin = (Selling price - Cost price / Selling price ) × 100
- Category = Grouped 128 items in the shop into 14 categories. The VLOOKUP function retrieved each item's category in the sales dataset from the purchase dataset.

Next, a descriptive statistical analysis was done using visuals created on the PowerBI desktop. Line charts were used to observe the daily trend of sales revenue, pie charts were used to analyze customer proportions among credit and non-credit customers, and bar charts were used to compare month-wise, day-wise, and category-wise revenue and profit margins for each category. Hence, the results from different visualizations and statistical analyses were analyzed so that actionable insights could be derived.
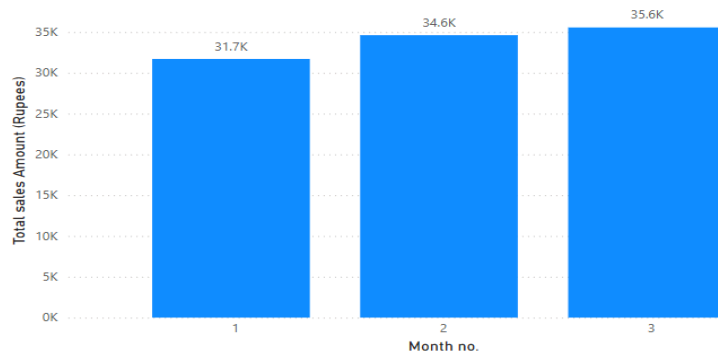
## 5. RESULT AND FINDINGS

5.1) Fluctuation in sales observed:
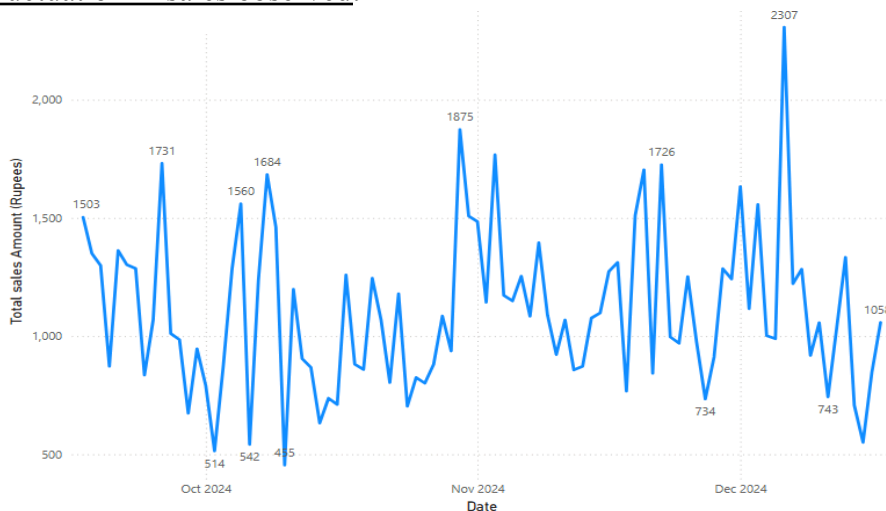


Graph 1

Graph 1 indicates that revenue is highly variable, with frequent peaks and troughs. Sales comparatively increased in November and December.
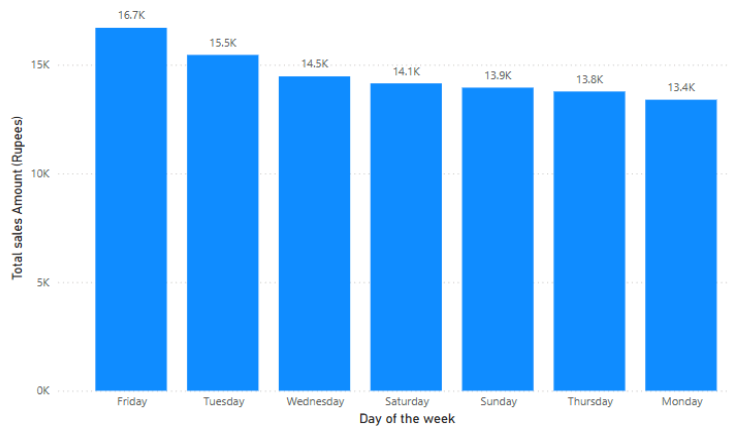
5.2) Upward trend in physical month sales:



Graph 2

Graph 2 indicates a slight increase in sales during the third month, with the months divided as follows: Month 1 (September 17–October 16), Month 2 (October 17–November 16), and Month 3 (November 17–December 17).
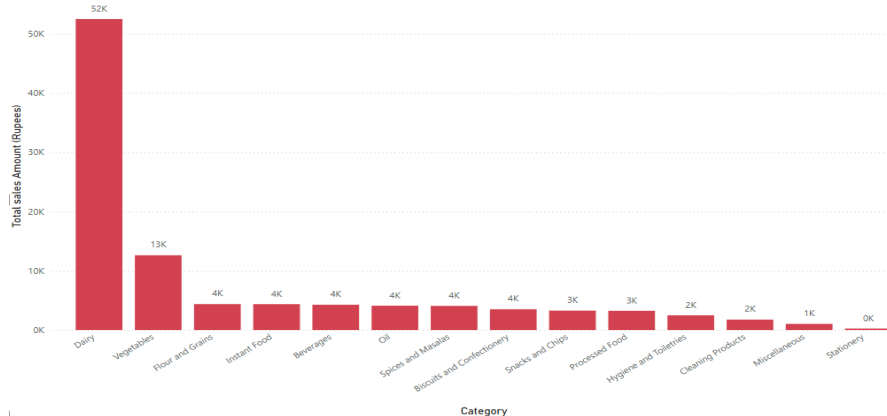
5.3) Slight differences observed between different days:



Graph 3

Graph 3 reveals that Friday had the highest sales, with Rs. 16,702 (16.4% of total sales across three months), while Monday had the lowest sales, at Rs. 13,392 (13%).

5.4) Dairy is the highest-selling product category:



Graph 4

Graph 4 shows that dairy products contribute Rs. 52,491 (51.52%) of the total Rs.1,01,492 revenue, while stationery adds just Rs. 250 (0.25%). The average revenue per category is Rs. 7,249, but only dairy and vegetables exceed this, indicating most categories fall below average.

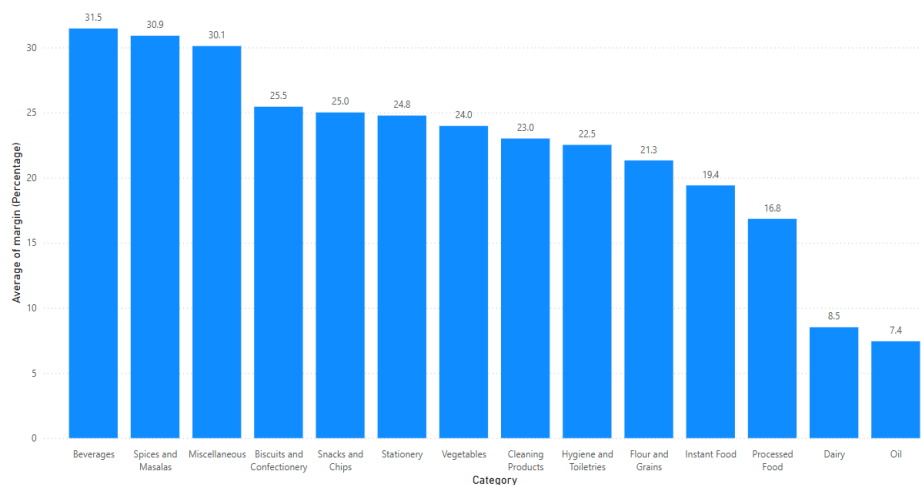5.5) <u>Quarter part of the total revenue from customers on credit:</u>

**Total sales Amount (Rupees) by Payment mode**
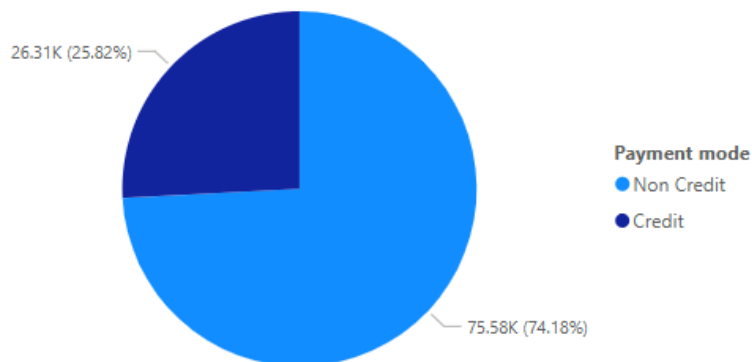


Graph 5

Graph 5 shows that credit customers contribute over 25% of revenue, paying on a monthly basis, while non-credit customers contribute 75%, paying upfront.

5.6) <u>Highest profit margin:</u>



Graph 6

Graph 6 shows that beverages have the highest profit margin, while dairy products generate the most revenue but have a very low profit margin.

5.7) Competitor analysis:

For the competitor analysis, the two nearest neighboring Kirana shops have been considered. From the recent analysis, it has been observed that Shop 1 mainly focuses on offering fresh chicken through home delivery, supported by a small farm adjoining the shop. Shop 2 has been noted for its variety of bananas, which are fresher compared to those available at our shop. Both shops maintain a bulk stock of cleaning and other household products. However, an advantage of our shop over both competitors is that dairy products like milk are always in stock. In contrast, limited quantities of milk are purchased by the other two shops, and on three occasions, milk was unavailable when requested. A SWOT analysis in the context of competition will be conducted and included in the final report.

Based on the above graphs used for conducting analysis and gaining insights, it is revealed that:

- Dairy products are the items with the highest sales volume, contributing more than 50% of the business's total revenue.
- Although dairy products contribute more revenue, beverages have a much higher profit margin, while dairy products have a very low profit margin.
- The monthly revenue trend shows a slight upward trend, which means that the sales from November 17 to December 17 2024 have higher sales. This can be due to the festive season and different holidays coming during that time. Also, it is noted that there are high sales on Fridays and public holidays.
- To increase the overall profit, more focus should be given to high-profit margin products included in the beverages, spices and masalas, and miscellaneous product categories, as the median quantity indicates most transactions are single-item purchases.