Dear Sir,

After thoroughly reviewing and analysing the Gala Stores Dataset, I understood how to better stock the items without overstocking or understocking.

Analysis:

Inferential Statistics:

Here are the inferential statistics of the dataset:

- The dataset contains 7829 transactions.
- Each transaction has a unique transaction_id.
- The transactions were made at 7738 unique timestamps, with the most frequent timestamp being '2022-03-02 19:32:20'.
- The timestamps suggest that the shop operates from around 09:00 A.M. to 8:00 P.M.
- The shop is open on all days of the week, as transactions are recorded for each day.
- The dataset includes transactions from 01 March 2022 to 07 March 2022.
- The transactions involve 300 unique products, with the product 'ecac012c-1dec-41d4-9ebd-56fb7166f6d9' being the most frequently purchased.
- The products belong to 22 unique categories, with 'fruit' being the most common category.
- The transactions were made by five unique customer types, with 'non-member' being the most common.
- The unit price of the products ranges from 0.19 to 23.99, with a mean of 7.82, a median of 7.19 and a standard deviation of 5.39.
- The quantity of products purchased in each transaction ranges from 1 to 4, with a mean of 2.50 and a standard deviation of 1.12.
- The total amount of each transaction ranges from 0.19 to 95.96, with a mean of 19.71, a median of 14.97 and a standard deviation of 17.45.
- The transactions were made using four unique payment types, with 'cash' being the most common.
- All columns have no null values.

2. Product Demands:

The most common type of category purchased is **fruit**, followed by vegetables & the least purchased category is spices and herbs.
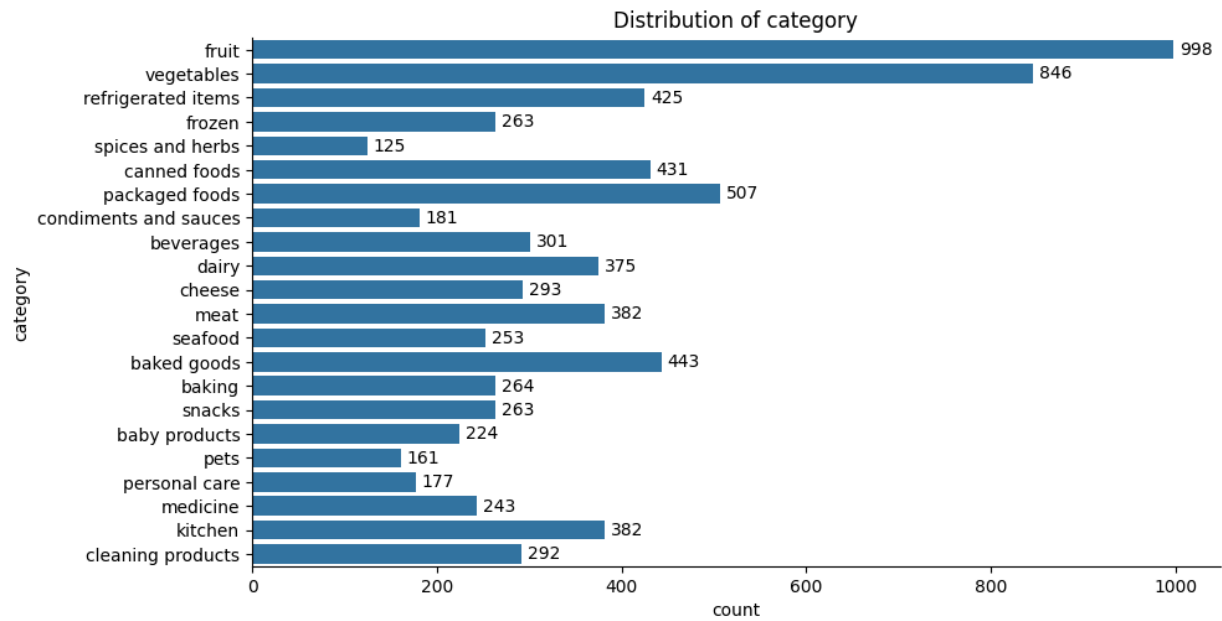
Fig 2.1 Distribution of Category
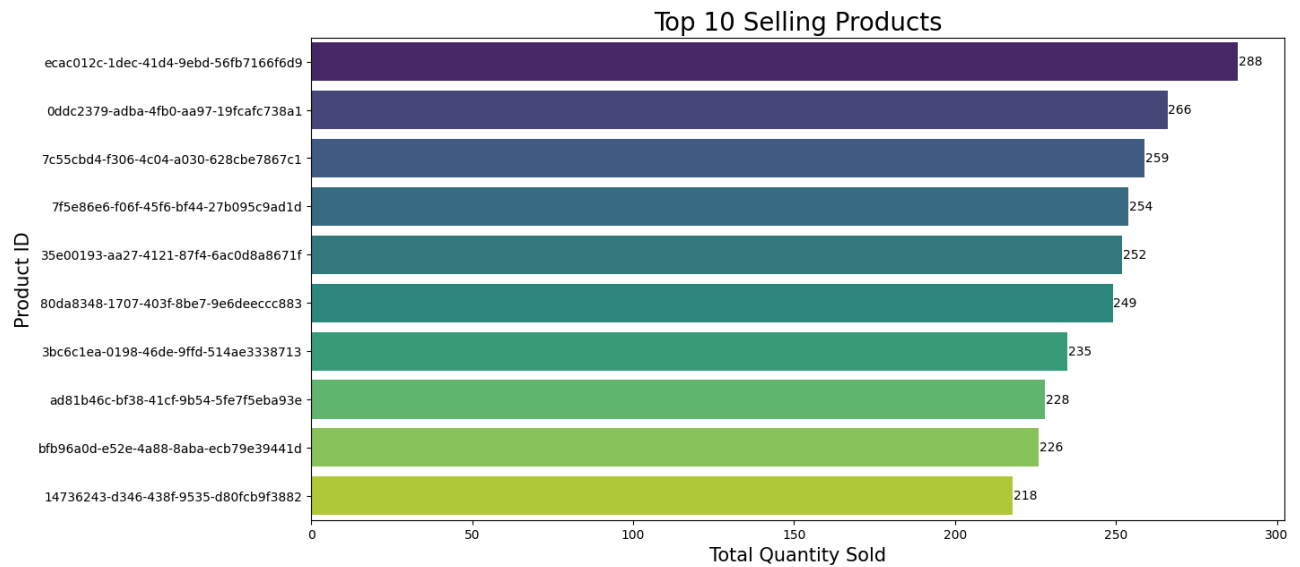
The top ten selling products are listed below.
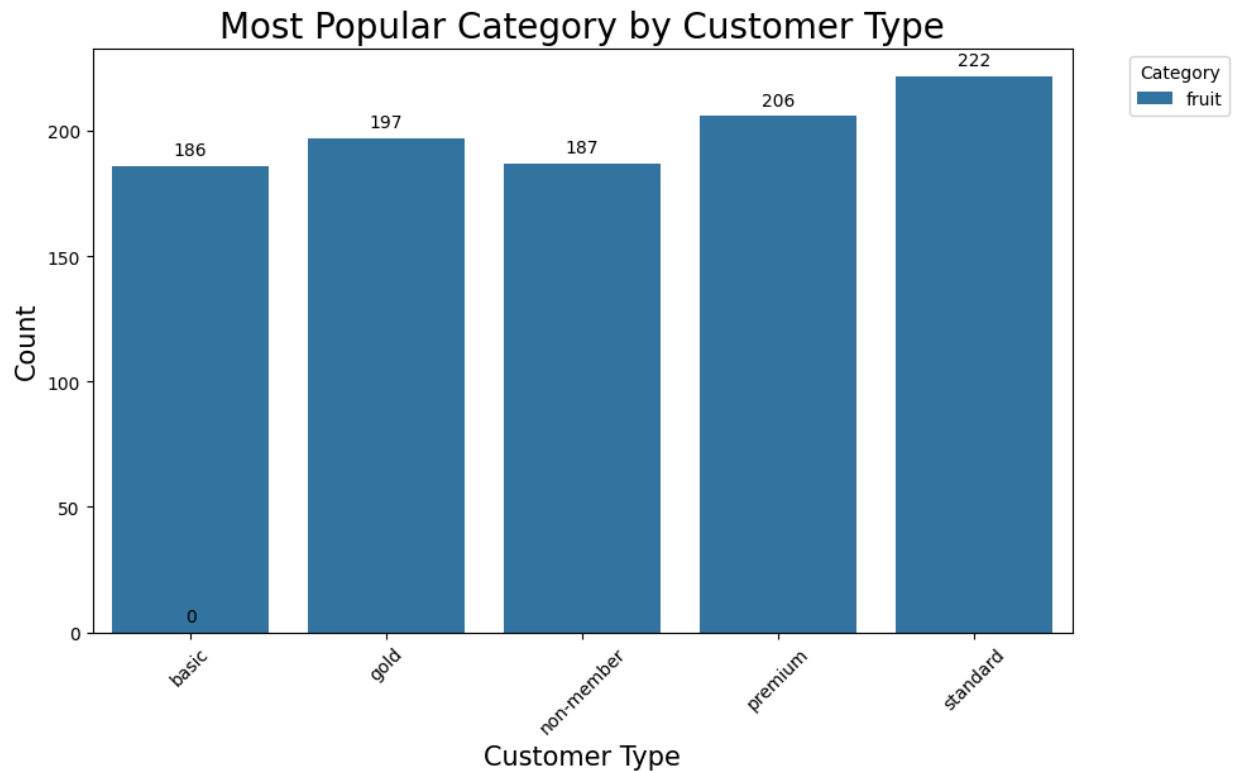

Fig 2.2 Top 10 Selling Products

Fig 2.3 Most Popular Category by Customer Type
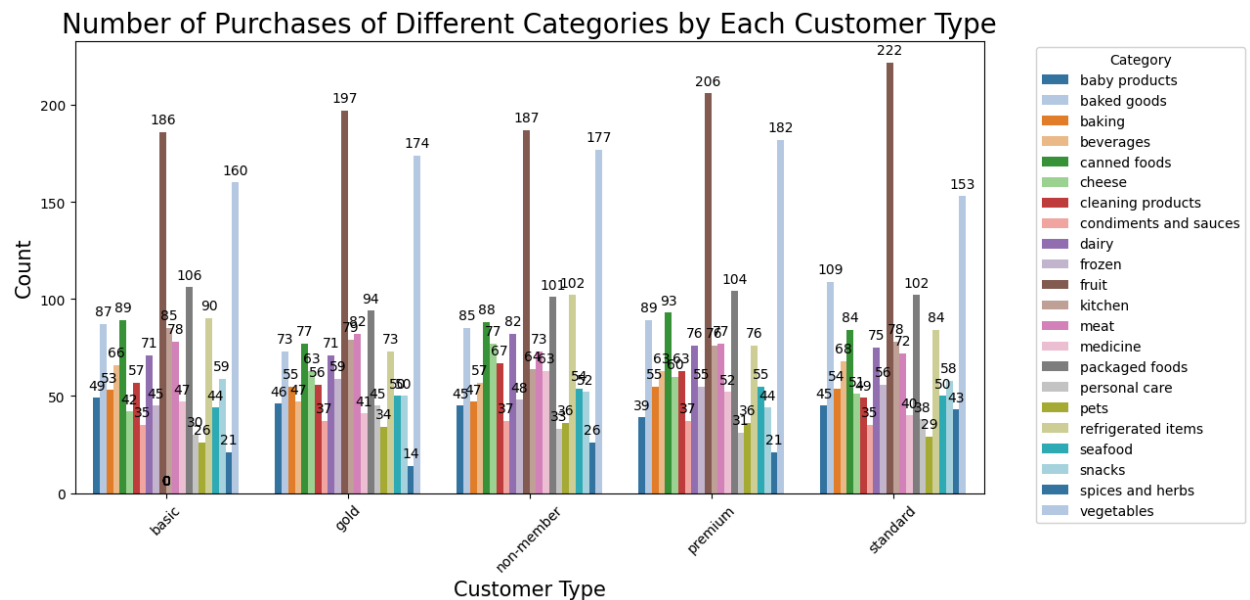**Fruit** remains to be the most popular category regardless of customer type.

Fig 2.4 Number of Purchases of Different Categories by Customer Type
Fruits and Vegetables are the most popular.
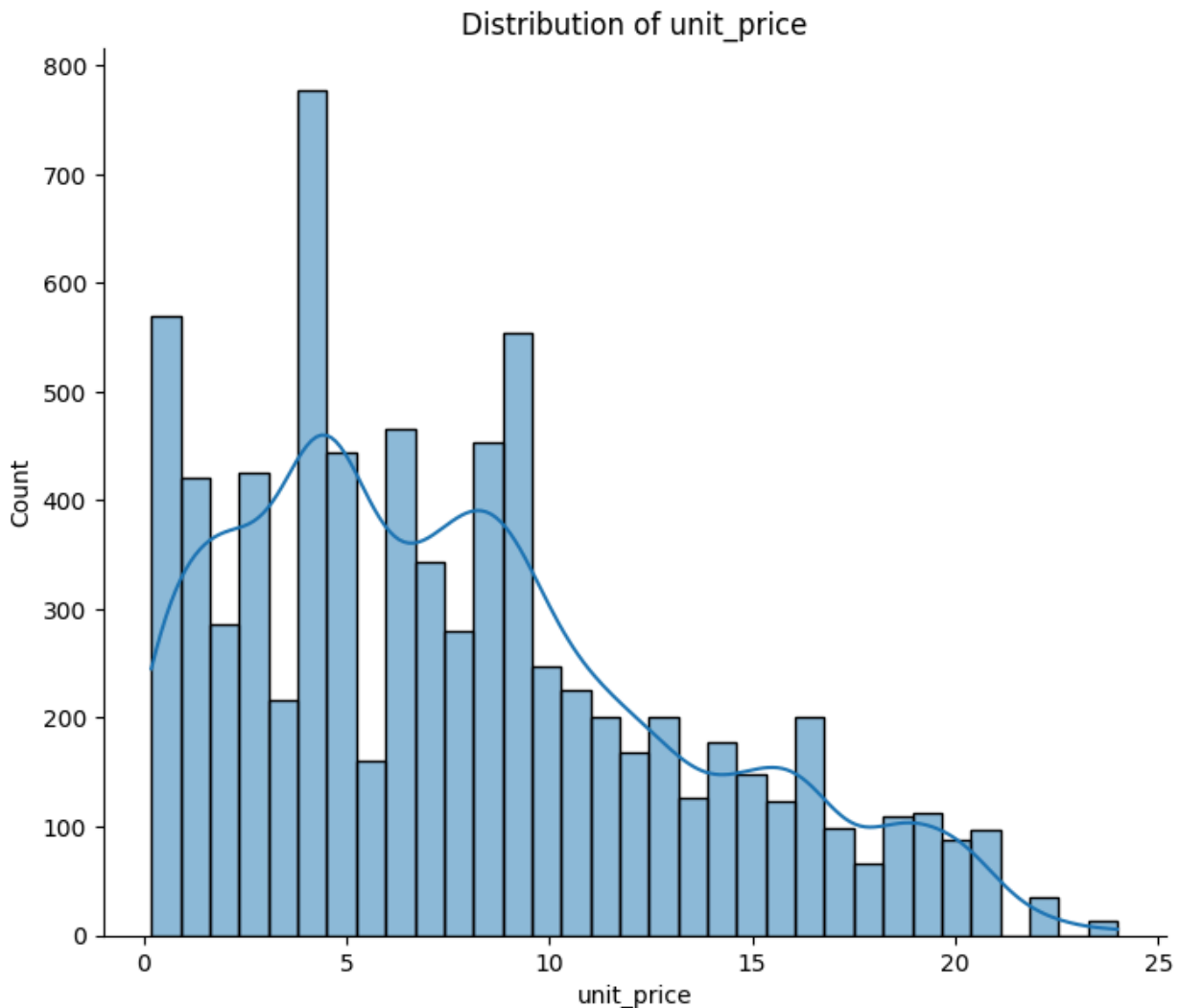
3. Revenue Generation:

Fig 3.1 Distribution of unit price

The distribution of unit prices is somewhat skewed, with a longer tail towards the higher end. This suggests that a small number of products may be sold at a significantly higher price point than most other items.

The distribution of the total amount spent is skewed to the right, meaning there are more transactions on the lower end (people spending less money) and fewer transactions on the higher end (people spending more money).
Outliers on the right side of the distribution indicate a small number of transactions where the total amount spent was much higher than usual.
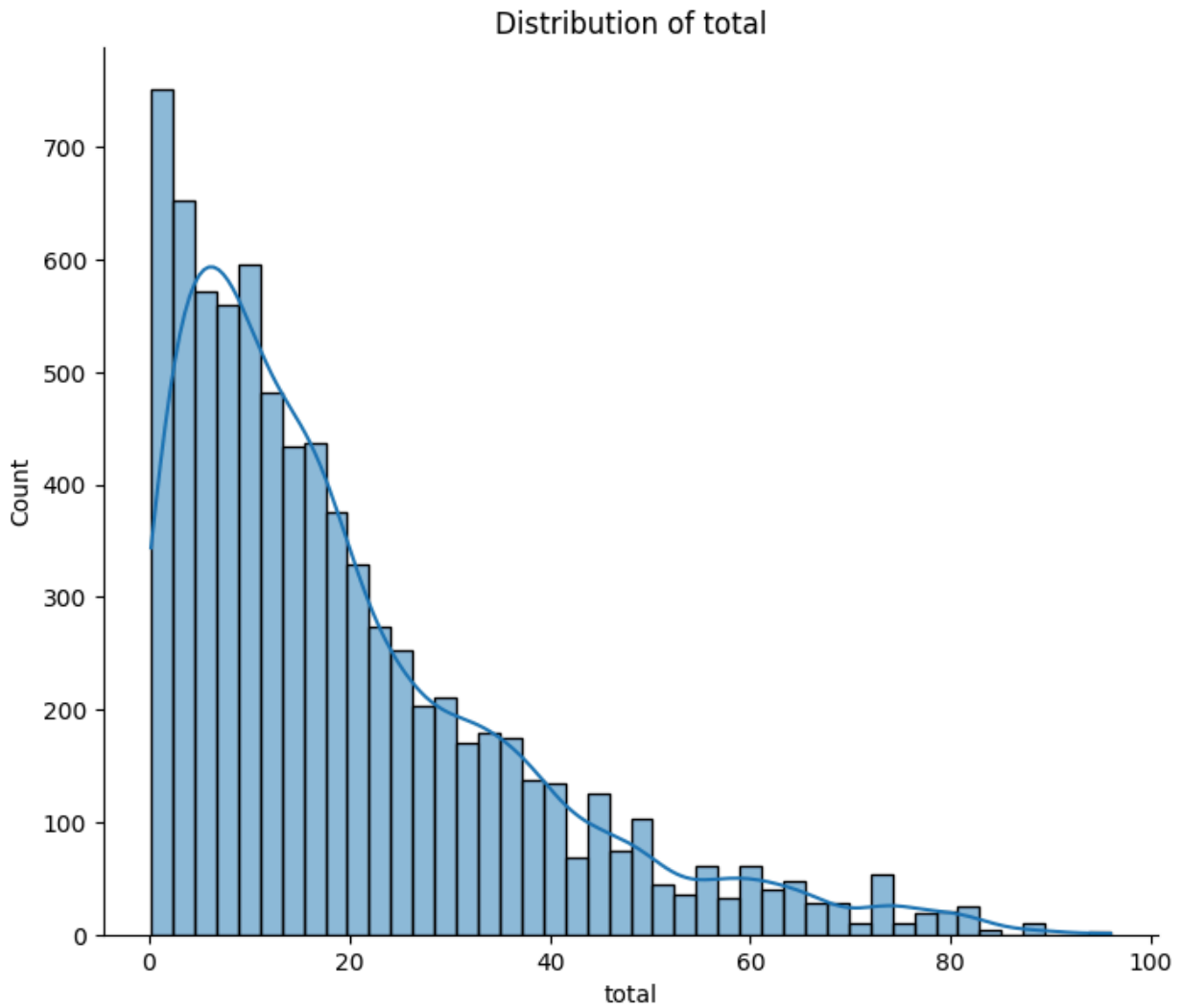
Fig 3.2 Distribution of total amount spent

Knowing the most significant revenue-generating categories, products, and customers is advantageous in increasing sales.
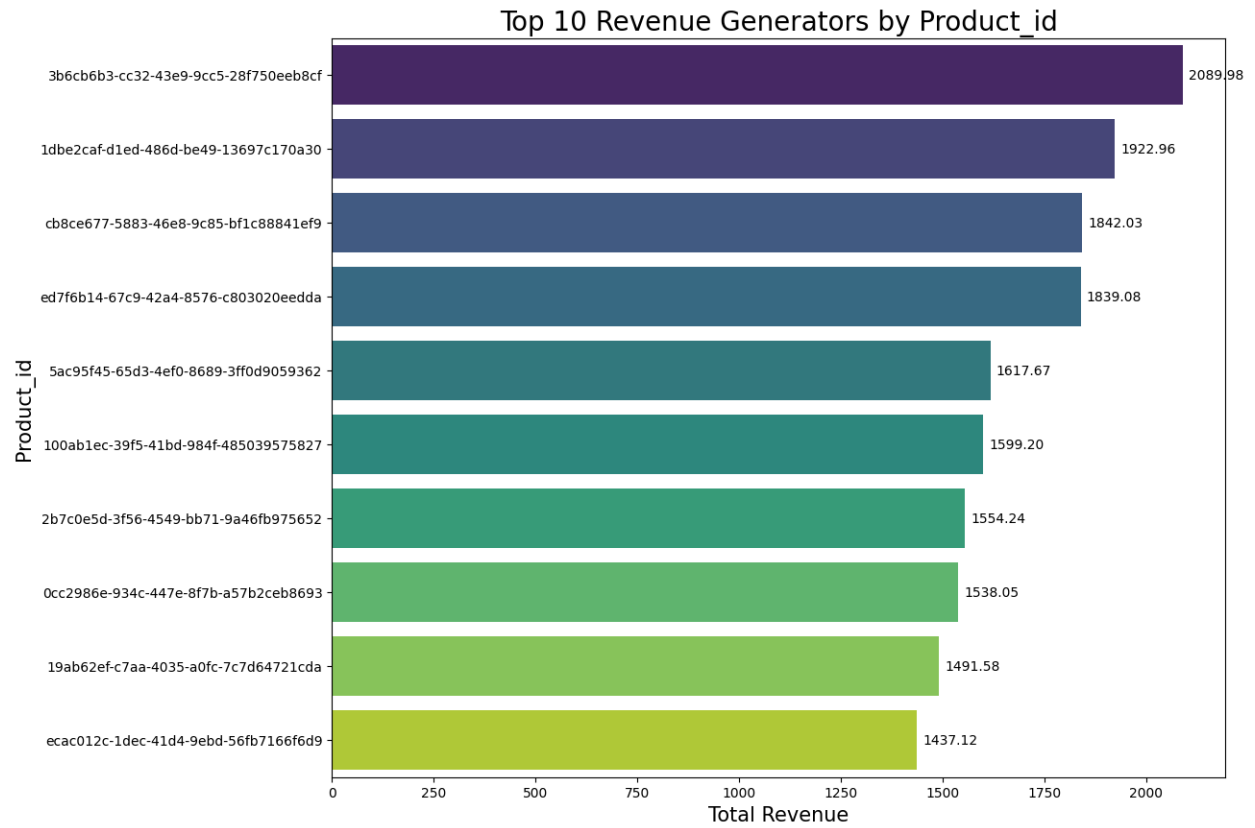
Fig 3.3 Top 10 revenue-generating products

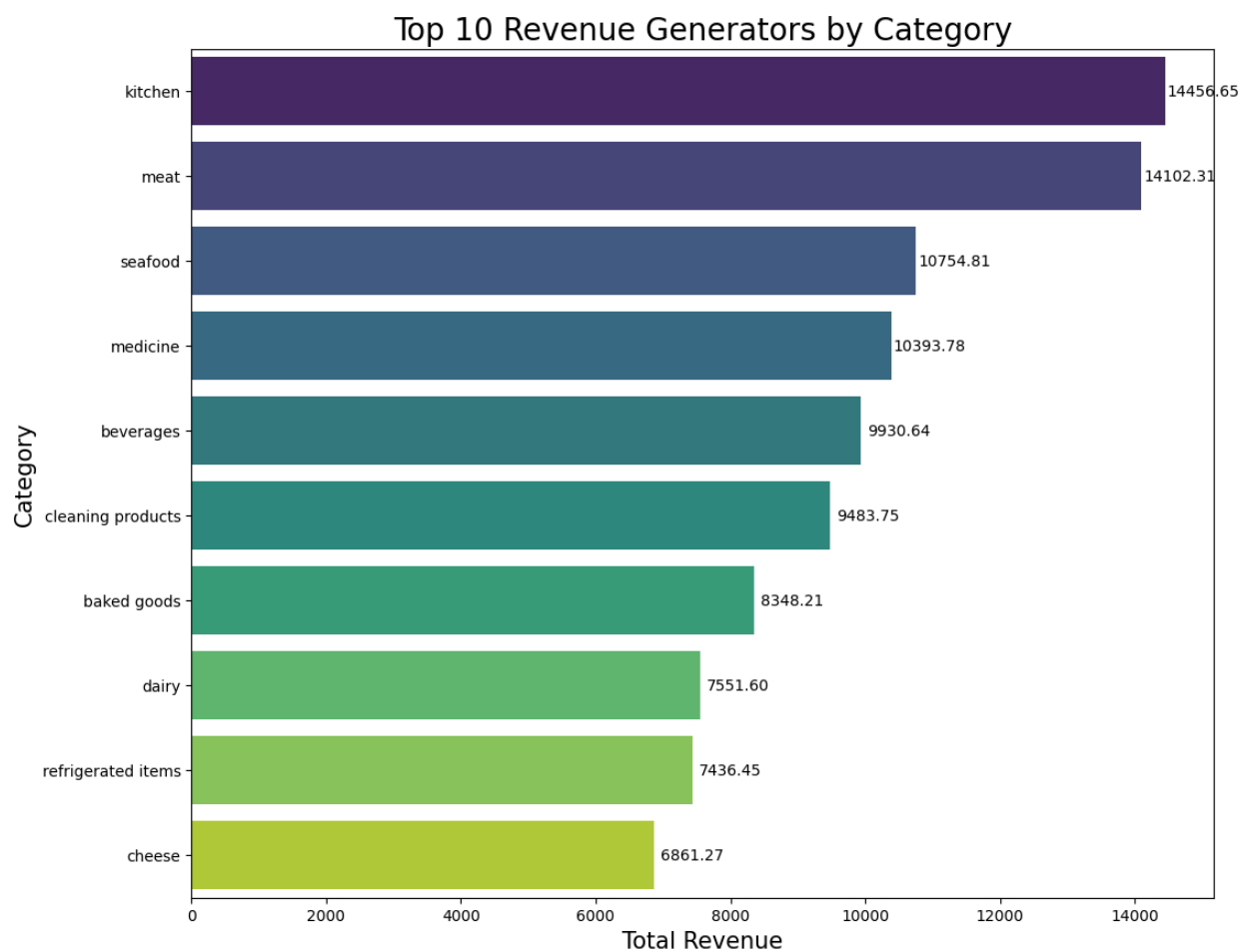Now, we know the products that increase the shop's revenue.

Fig 3.4 Top 10 revenue-generating categories

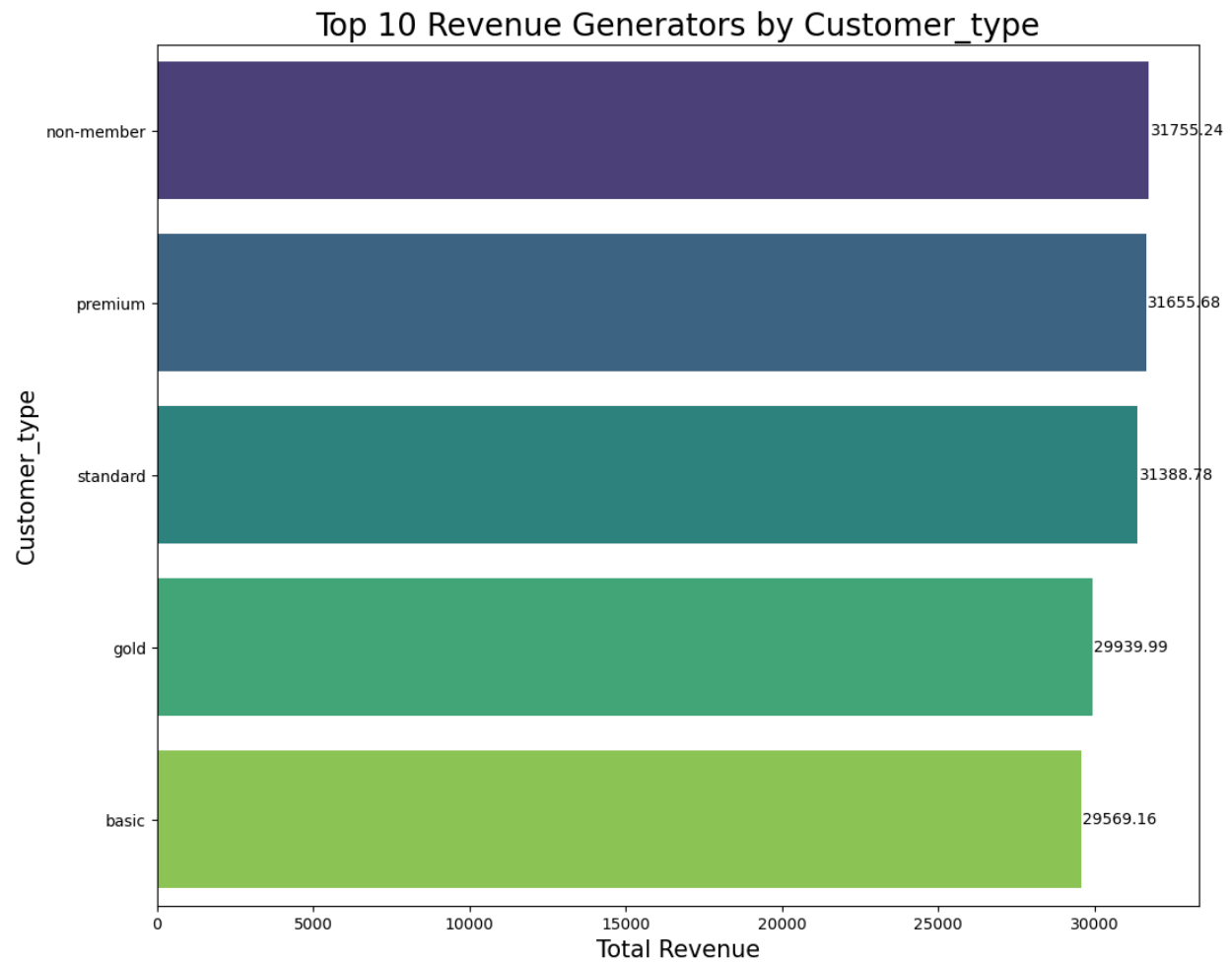**Kitchen Appliances,** followed by meat, are the main revenue-generating categories.

Fig 3.5 Top revenue-generating customer types

Most of the revenue is acquired from **Non-members**.

4. Customer Behaviour:

There are five unique types of customers:

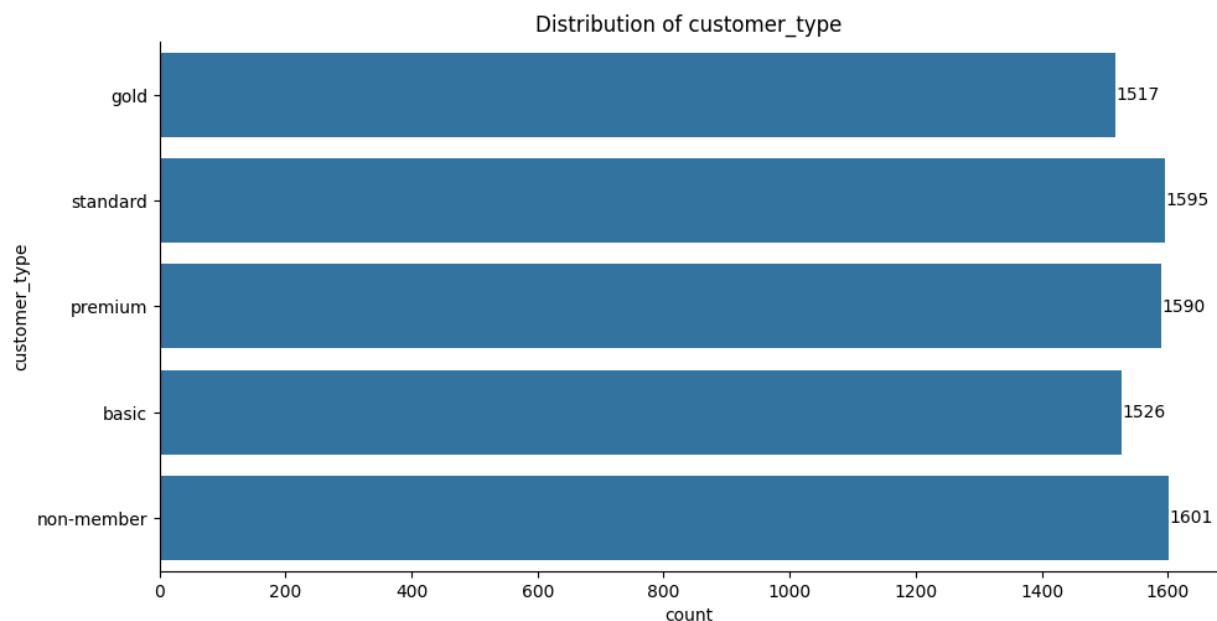| Customer type	Count
Gold	1517
Standard	1595
Premium	1590
Basic	1526
Non-member	**1601**

Fig 4.1 Distribution of Customer Types

The basis for categorising customers into groups is still being determined.
However, based on standard practices in customer segmentation & analysing their behaviour from the dataset, here are some possible explanations:

1. 'Gold': These could be the most loyal customers who make frequent purchases and spend significant money. They might also be customers who have been with the store flong

2. 'Standard': These customers might make regular purchases and spend a moderate amount of money. They could be long-term cut, not as frequent or high-spending as 'Gold' customers.

3. 'Premium': These could be customers who spend a lot per purchase but don't shop as frequently. They might buy more expensive items each time they shop.

4. 'Basic': These might be infrequent shoppers or customers who spend less money per visit. They could also be newer customers who still need to establish a shopping pattern, i.e., who only shop occasionally.

5. 'Non-member': These could be customers who still need to sign up for a membership or loyalty program. Their shopping habits could vary widely.

These are just educated guesses. The actual criteria used to classify customers could be different. They might be based on a combination of factors such as purchase frequency, average spending, types of products purchased, length of relationship with the store, participation in loyalty programs, etc.

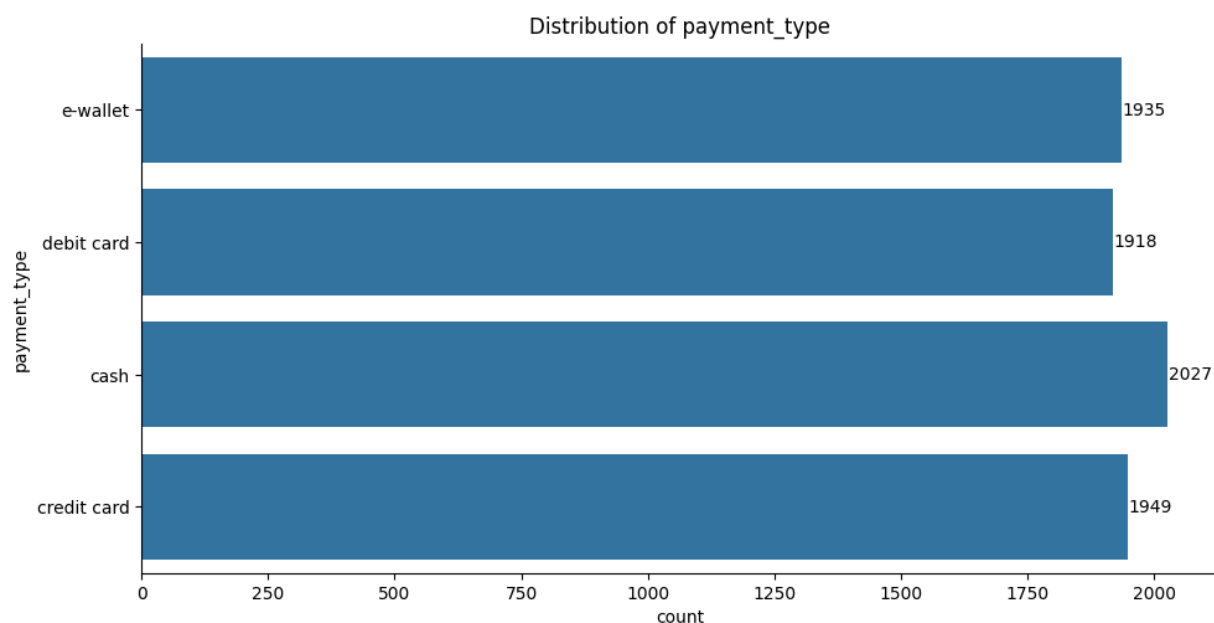**Non-members** are the most common customer type.

Fig 4.2 Distribution of Payment Types

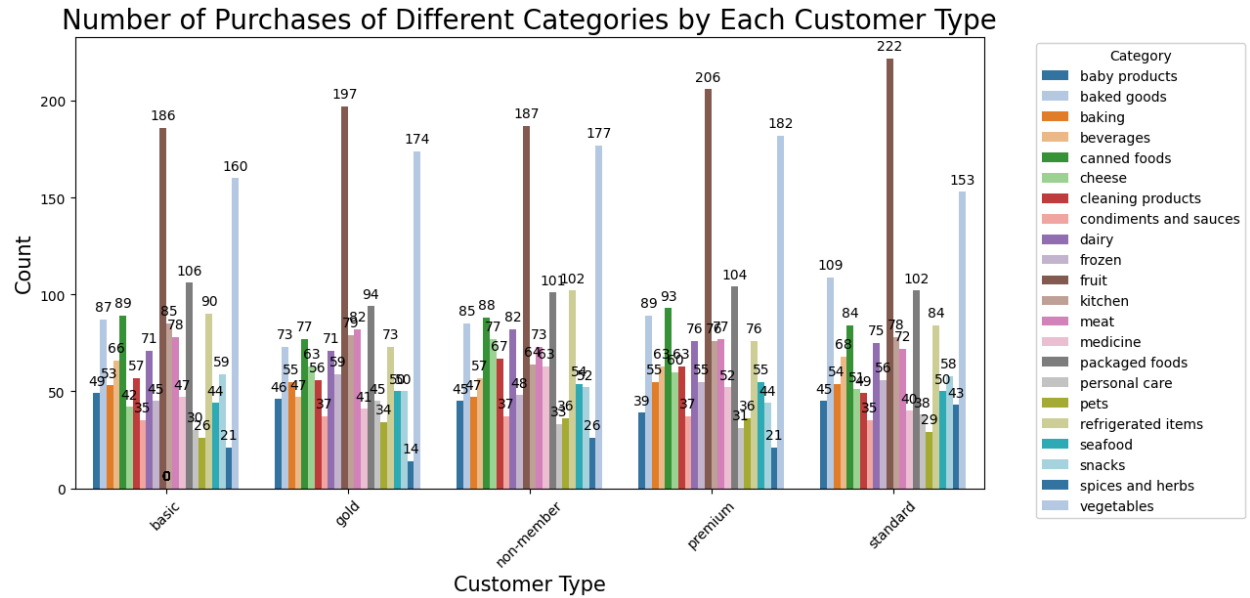**Cash** is the most preferred payment method.

Fig 4.3 No. Of purchases of different categories by each customer type

How do Kitchen & Meat products generate more revenue despite fruits & vegetables being the most popularly purchased categories?
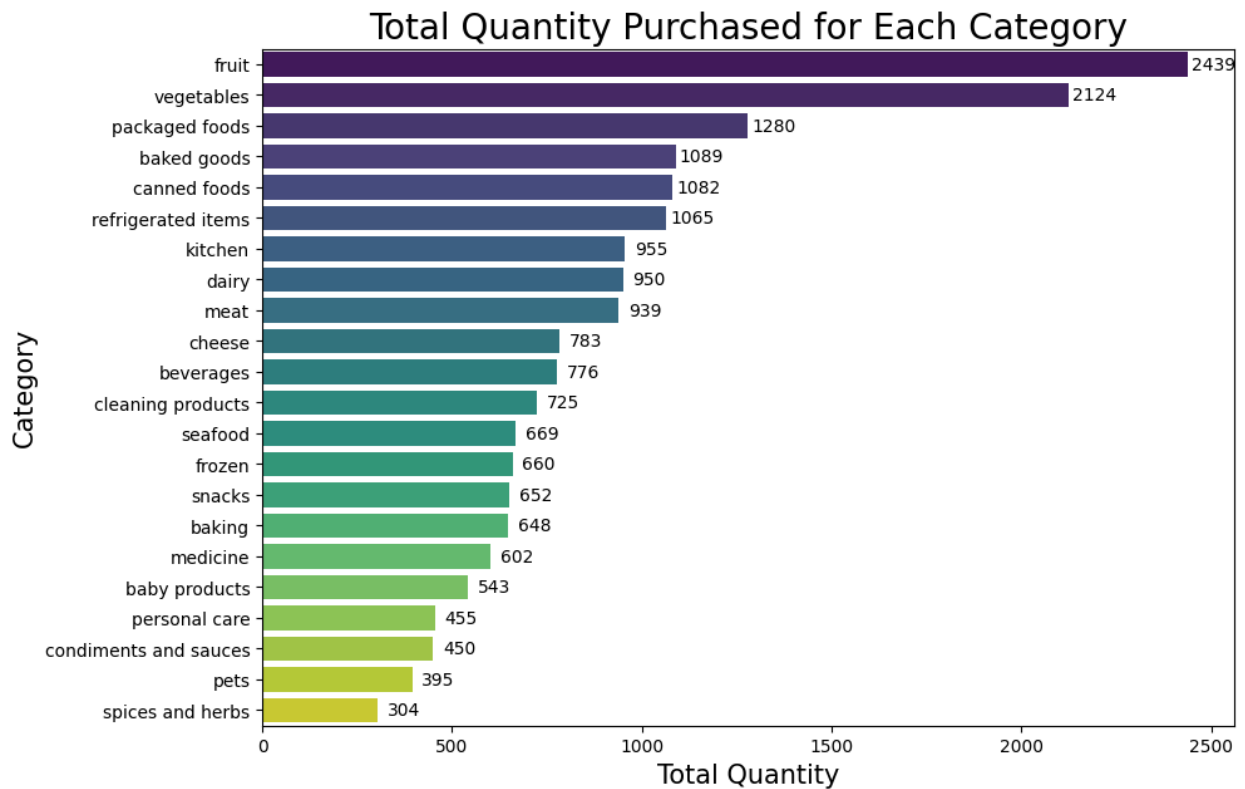

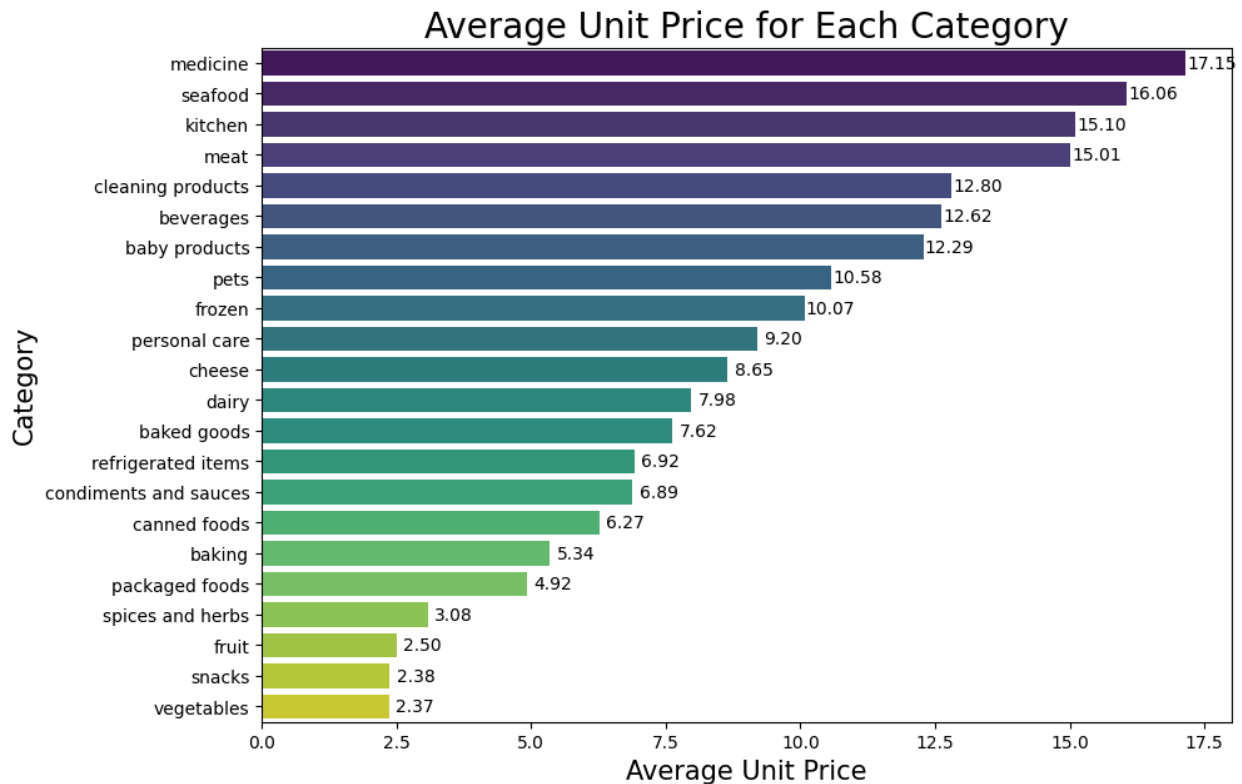**Fig 4.4 Total Quantity purchased for each category**

Fig 4.5 Average Unit Price for each category

The average unit price for products in the 'kitchen' category is higher than those in the 'fruit' category. This could be one of the reasons why the 'kitchen' category contributes more to the revenue despite the 'fruit' category being more popular.

Fruits are purchased more frequently and in larger quantities than kitchen and meat products. Here are the total quantities purchased for each category from the plot:

- Fruit: 2439
- Kitchen: 955
- Meat: 939

This means that customers tend to buy larger quantities of fruits in a single transaction, making it the most popular category. However, even if customers buy fewer kitchen and meat items, the total revenue could be higher due to the higher unit price.
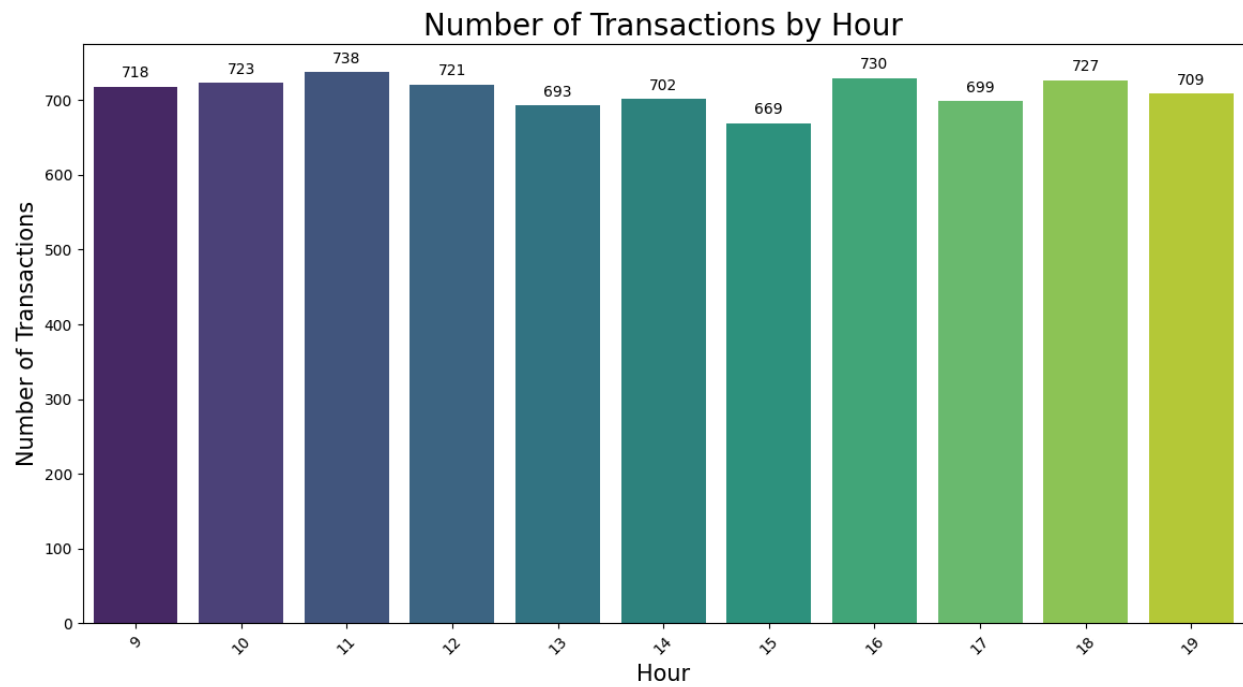
5. Sales Trends:

Fig 5.1 No. of transactions per hour
The busiest hour is the **11th hour**.
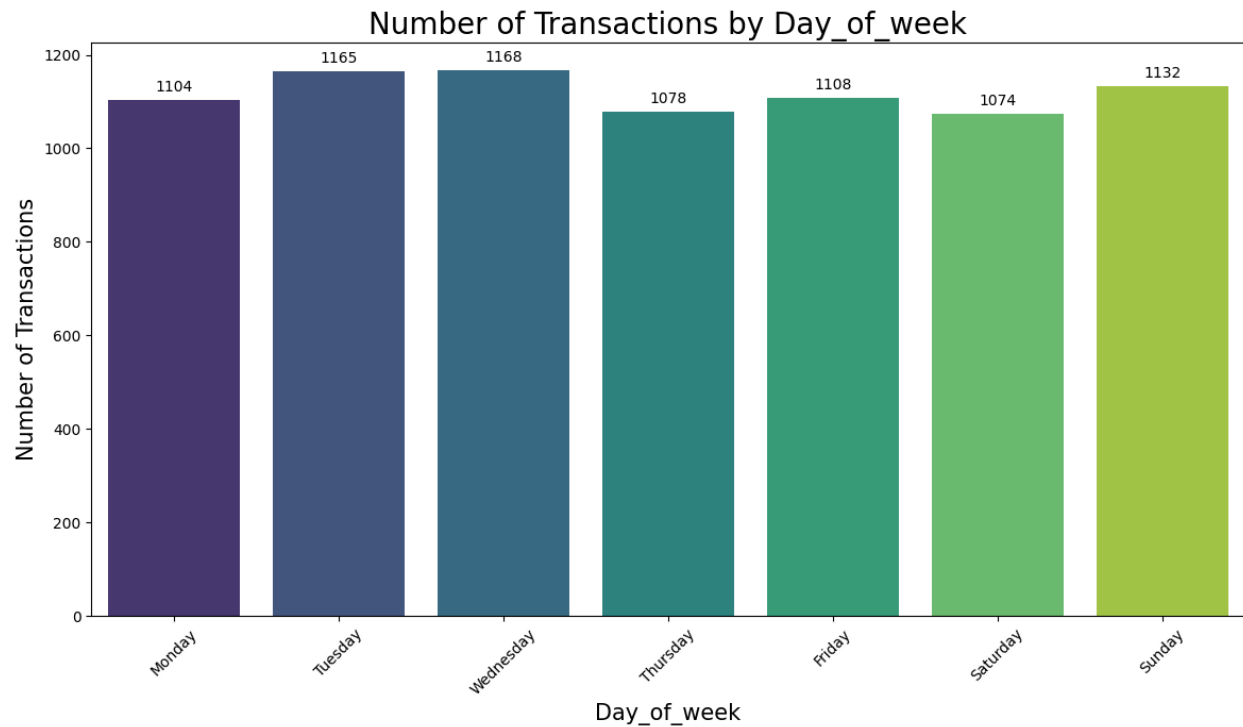
Fig 5.2 No. of transactions per day
Wednesday, followed by Tuesday, is the busiest day of the week.

From the above plots, the store is occupied most of the time every day of the week, with more than thousands of transactions happening daily. So, it is not useful in determining when a restock is necessary. So, I divided the timestamps into three sections:

-   Morning(09:00 to 11:59)
-   Noon (12:00 to 15:59)
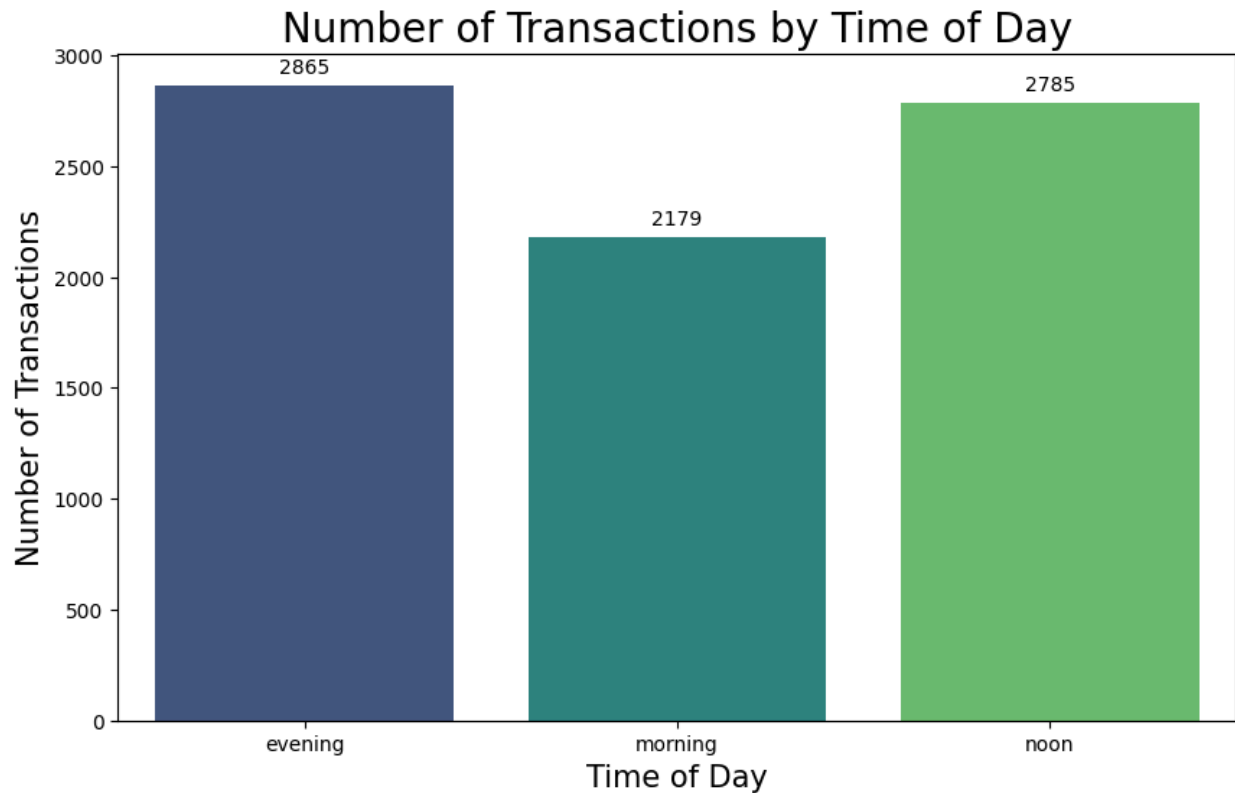-   Evening(16:00 to 19:59)

Fig 5.3 No. Of by time of day

Now, it is clear that people mostly shop during the **evenings**. The shop gets progressively busier afternoon.
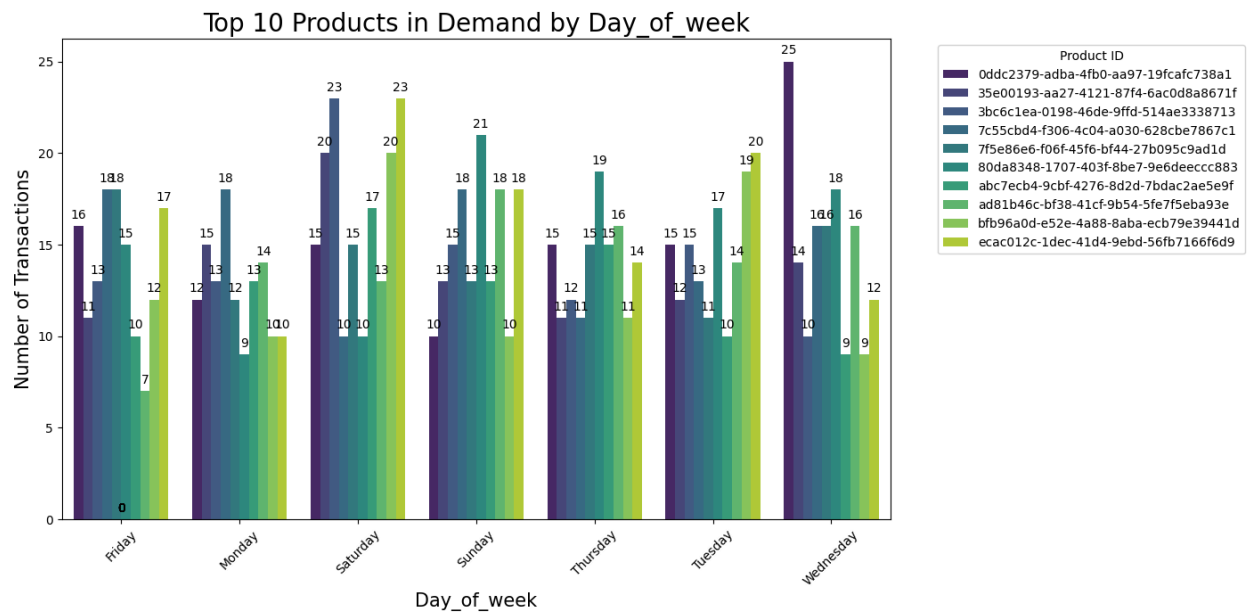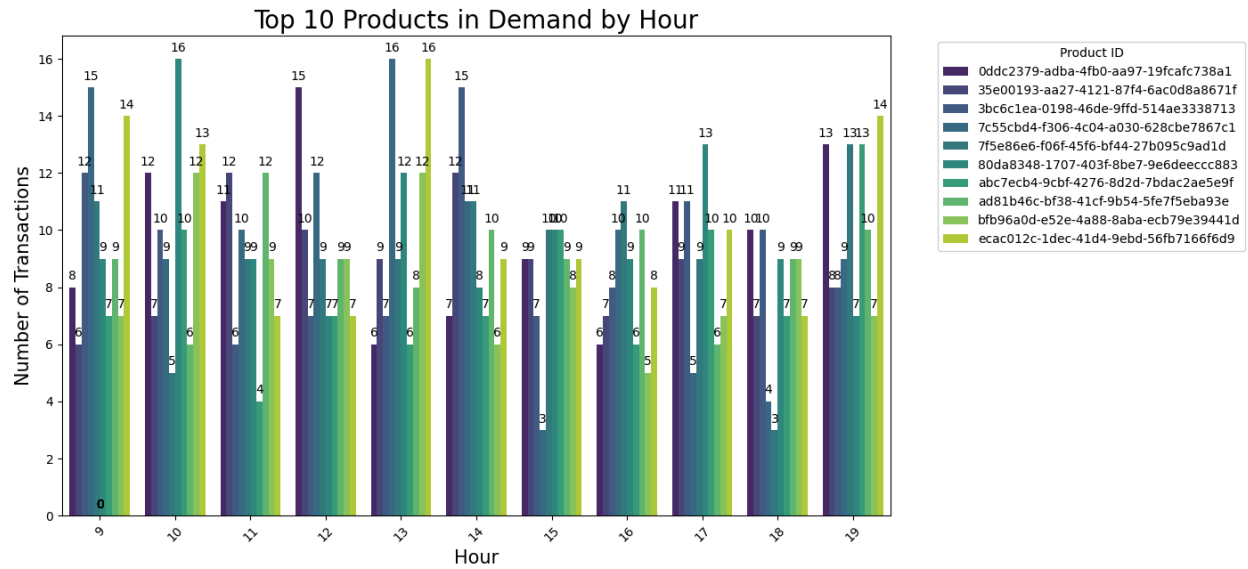

Fig 5.4 Top 10 Products in Demand by Day

Fig 5.5 Top 10 Products in demand by hour

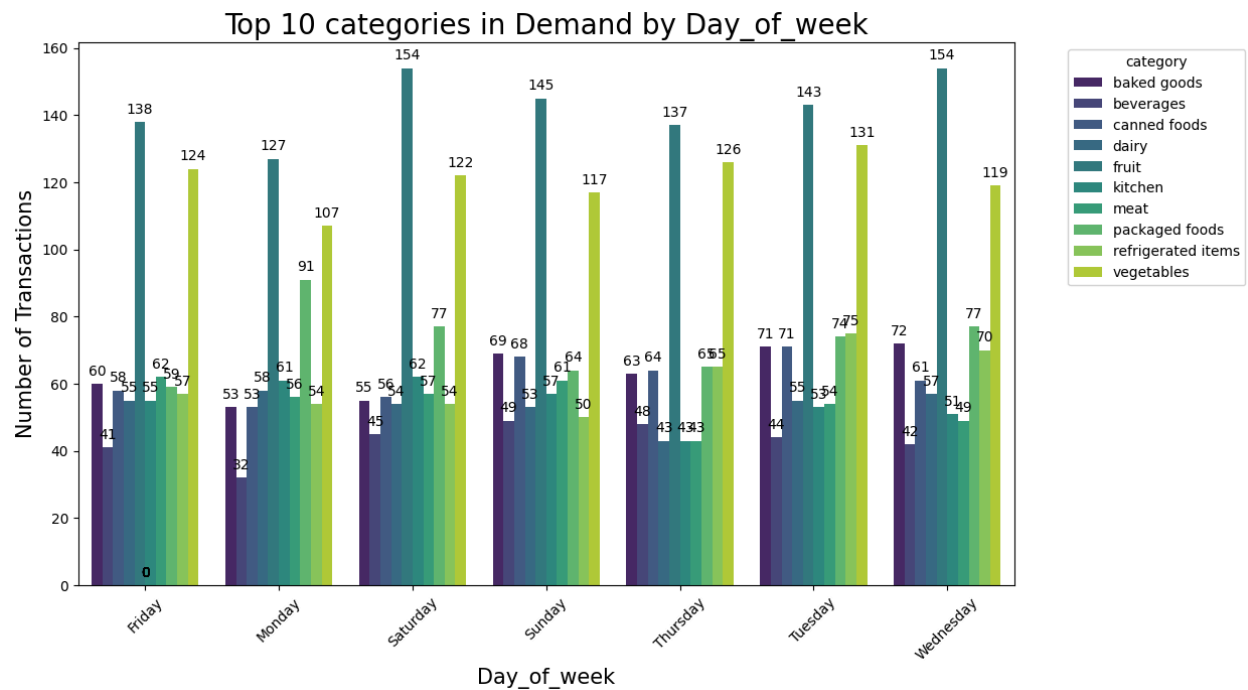The most in-demand ten products are the same when listed by hours or days of the week.

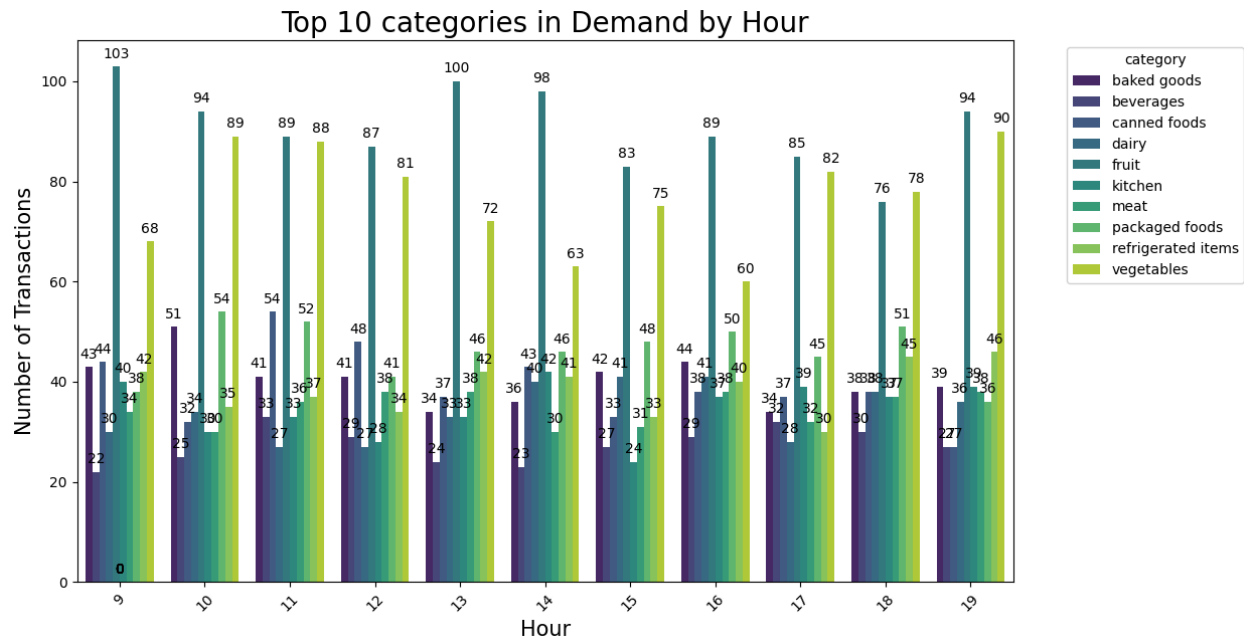**Fig 5.6 Top 10 Categories in Demand by Day**

Fig 5.7 Top 10 Categories in Demand by Hour

The most in-demand ten categories are the same when listed by hours or days of the week. **Fruits and vegetables** are purchased frequently.

Insights:

For better stocking the items that Gala Stores sell:

- **Stock More Fruits and Vegetables:** Since fruits and vegetables are the most frequently purchased categories, ensuring they are always in stock would be beneficial. It involves ordering larger quantities or ordering more regularly to maintain freshness.

- **Focus on Non-Members:** Since most of the revenue comes from non-members, strategies might be worth considering to convert these customers into members. This could involve offering membership benefits such as discounts or loyalty points. Additionally, understanding non-members' shopping habits and preferences could help in stocking items that appeal to this group.

- **Consider High-Priced Items:** The distribution of unit prices suggests that a small number of products are sold at a significantly higher price point than most other items. If these high-priced items are also high in demand, keeping a good stock of them could be beneficial.

- **Prepare for Peak Times:** The busiest times are the 11th hour and the evenings, and the busiest days are Wednesday and Tuesday. The stock should be prepared and replenished in anticipation of these peak times to ensure that popular items don't run out.

- **Payment Methods:** Since cash is the most preferred payment method, ensuring enough change is available at the cash registers, especially during peak hours, is essential.

- **Kitchen Appliances and Meat:** Although these categories might not be the most frequently purchased, they generate significant revenue. Therefore, it's also essential to maintain a good stock of these items.

- **Monitor Top 10 Products:** Keep a close eye on the stock levels of the top 10 most in-demand products. These items will likely run out quickly, especially during peak shopping times.

- **Restock during mornings:** Restocking while the store is less busy means there will be less disruption to customers, and the staff can work more quickly and effectively without having to navigate around customers. This can make for a better shopping experience. This can ensure that popular items are available in sufficient quantities for the peak shopping hours. For items like fruits and vegetables, restocking in the morning can ensure that the freshest produce is available for customers throughout the day.

Based on the insights from the dataset, here are some suggestions to increase the revenue of Gala Stores:

- **Membership Program**: Since most of the revenue comes from non-members, introducing a membership program with attractive benefits could encourage these customers to become members and potentially increase their spending. Benefits include discounts, early access to new products, or loyalty points that can be redeemed for products.

- **Promote High-Priced Items**: The data shows that a small number of products are sold at a significantly higher price point than most other items. If these high-priced items are also popular, promoting them could increase revenue. This could be done through in-store displays, online advertising, or targeted marketing to customers who purchased these items.

- **Stock Optimization**: Ensure that popular items, especially in the fruit and vegetable categories, are always in stock to avoid lost sales. Additionally, consider stocking more of the top 10 in-demand products, as these will likely sell quickly.

- **Peak Time Offers**: Since the store gets busier in the 11th hour and evenings, consider offering special deals or promotions to encourage spending more on discounts on certain items, buy-one-get-one-free offers, or bonus loyalty points.

- **Day of the Week Specials**: With Wednesday and Tuesday being the busiest days, consider having special offers or promotions to boost sales. This could also spread out demand throughout the week.

- **Upsell and Cross-Sell**: Implement upselling and cross-selling strategies. For example, suggest complementary items like kitchen utensils or appliance warranties if a customer buys a kitchen appliance. Suggest accompanying items like spices or marinades if a customer is buying meat.

- **Payment Options**: Since cash is the most preferred payment method, consider offering incentives for using other payment methods that encourage larger purchases, such as credit or debit cards. This could include small discounts or bonus loyalty points.

Recommendations:

- The dataset consists of transactions made in March 2022 only. More historical data is essential to analyse customer behaviour and Sales trends accurately.

- Consider collecting customer feedback to make informed decisions about stocking items.

Best regards,

Farsana K S