

Driving Growth in Retail

**Data-Driven Analysis of Sales Trends
& Customer Segments**



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Background

This project analyzes sales transaction data from an e-commerce or retail store to understand sales patterns and trends, as well as identify opportunities to improve business profitability. The data analyzed includes information such as transaction date, product details, quantity, price, customer information, and country.

The main objective of this analysis is to answer crucial business questions such as monthly sales trends, best-selling products, customer purchasing behavior (number of products per transaction), identifying the most profitable customer segments, and strategic recommendations to increase profit. By understanding insights from the data, businesses can optimize sales, marketing, and operational strategies to achieve sustainable growth and profitability.



Objectives

Understand & Predict Sales Trends

Identify monthly sales trends and the impact of promotional campaigns to forecast future sales and optimize marketing strategies.

Optimize Product Sales

Identify best-selling products and understand customer preferences for stock and promotion strategy optimization, as well as assess price sensitivity to determine the best pricing strategy.

Increase Customer Value

Understand customer behavior in terms of quantity of products purchased and identify upselling and cross-selling opportunities, along with customer retention strategies.

Data Understanding

- **transaction_id**: Unique ID for each transaction
- **date**: Date and time of the transaction
- **product_id**: Unique ID for each product
- **product_name**: Product name
- **price**: Product price
- **quantity**: Number of products purchased
- **customer_id**: Unique ID for each customer
- **country**: Country where the transaction took place



Growia LMS



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4   product_name    527764 non-null object
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EDA

Exploratory Data Analyst

1

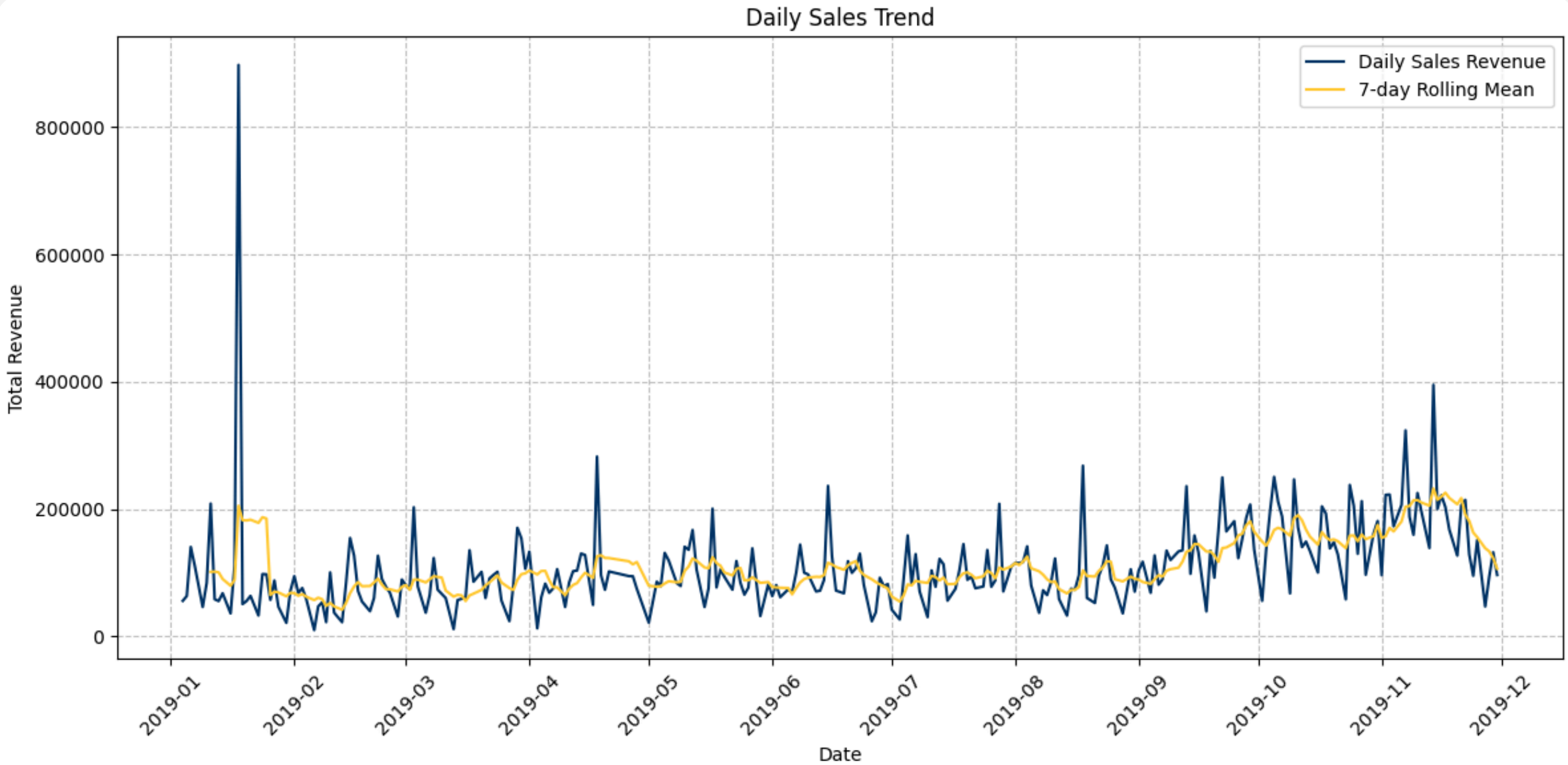
Overall sales trends show an initial spike in January, followed by stabilization and gradual growth with a noticeable increase toward the end of the year.

2

There are significant daily fluctuations, as shown by the "Daily Sales Revenue" graph.

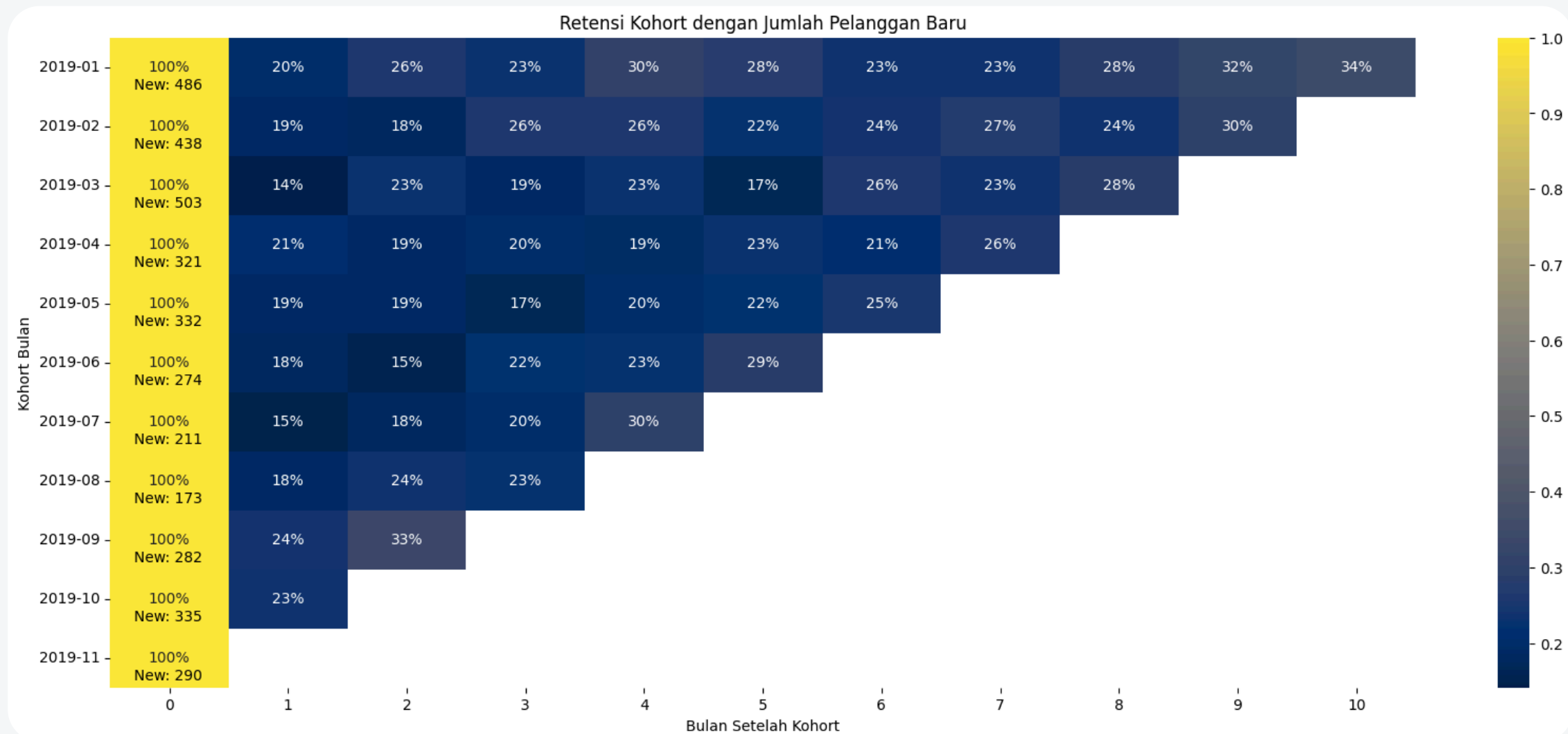


Sales Trend



How was the sales trend over the months?

Churn & Growth Condition Customers



How is the customer retention trend over time?

January and February 2019 had high long-term retention, with customers remaining until month 10. September 2019 also showed strong second-month retention, indicating that the promotional campaigns in those months were likely very effective.



1

New customer growth is inconsistent, with strong growth periods at the beginning and end of the year, and a decline in the middle of the year.

2

Highest retention observed in January 2019, with increased retention in months 9 and 10 (32%–34%).

3

February 2019 also had strong retention (30%), slightly below January.

4

September 2019 showed high second-month retention (33%).

5

Other cohorts tended to have lower retention.



Customer Segmentation

Spending Segment	Frequency Segment	Final Segment
High Value	High Value	Champion
High Value	Medium Value / Low Value	Loyal
Medium Value / Low Value	High Value	Loyal
Medium Value	Medium Value	Regular
Low Value	Low Value	Churned

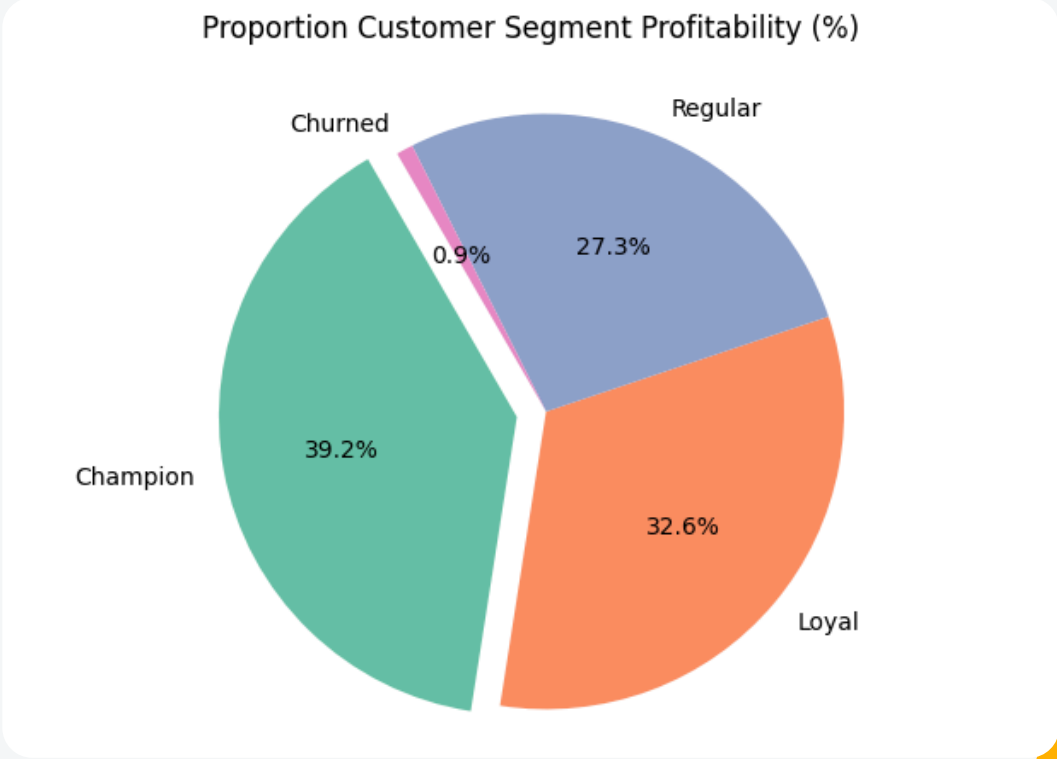
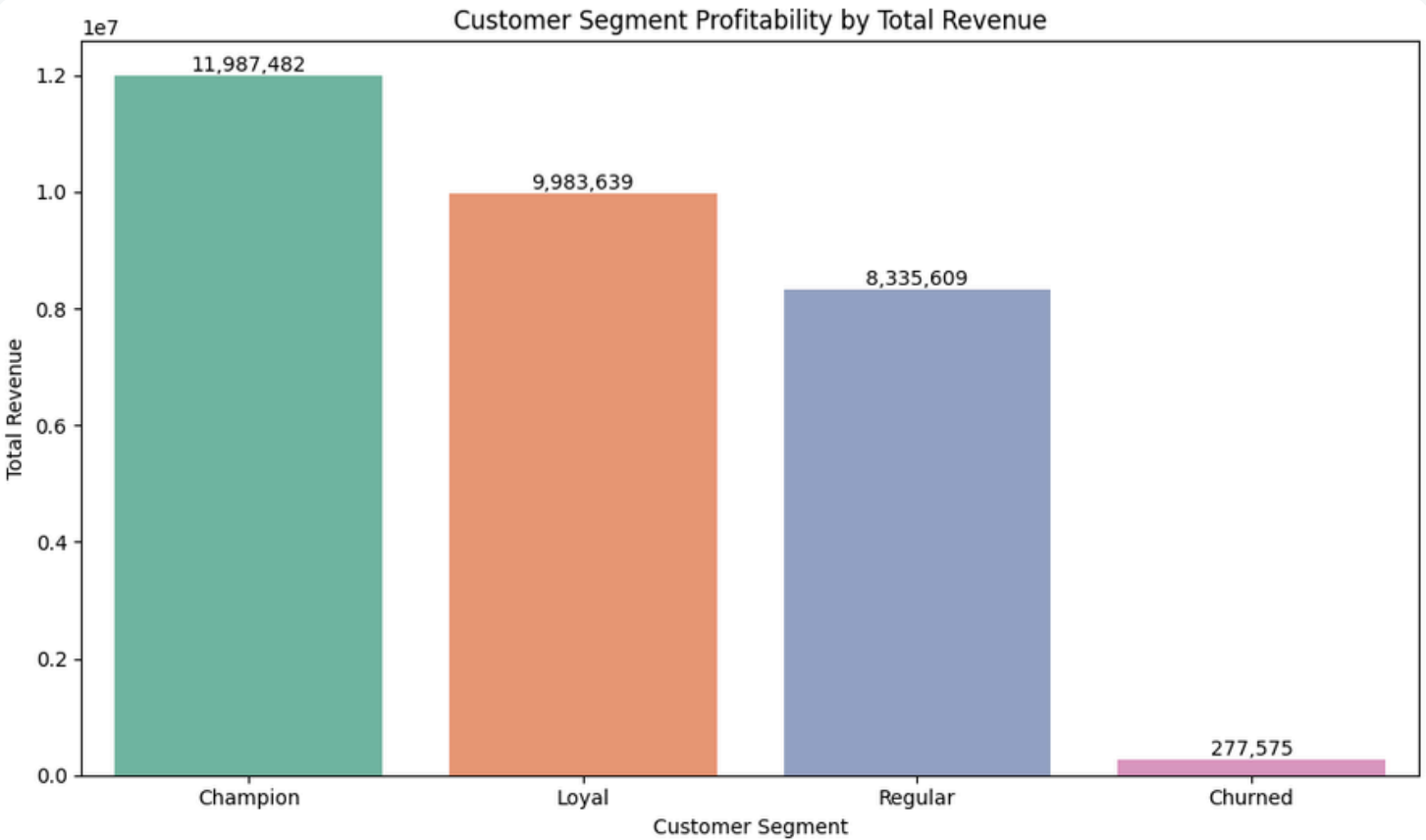
	customer_id	total_spending	purchase_frequency	spending_segment	frequency_segment	final_segment
0	12004.0	1509.60	56	Medium Value	Medium Value	Regular
1	12006.0	24.76	1	Low Value	Low Value	Churned
2	12008.0	5689.57	203	Medium Value	High Value	Loyal
3	12024.0	149.52	5	Low Value	Low Value	Churned
4	12025.0	1021.59	46	Low Value	Medium Value	Regular
5	12026.0	20486.32	409	High Value	High Value	Champion
6	12031.0	136.18	7	Low Value	Low Value	Churned
7	12042.0	6296.77	223	Medium Value	High Value	Loyal
8	12043.0	1235.59	36	Low Value	Medium Value	Regular
9	12050.0	141.67	10	Low Value	Low Value	Churned

Segmentation is based on total spending and purchase frequency:

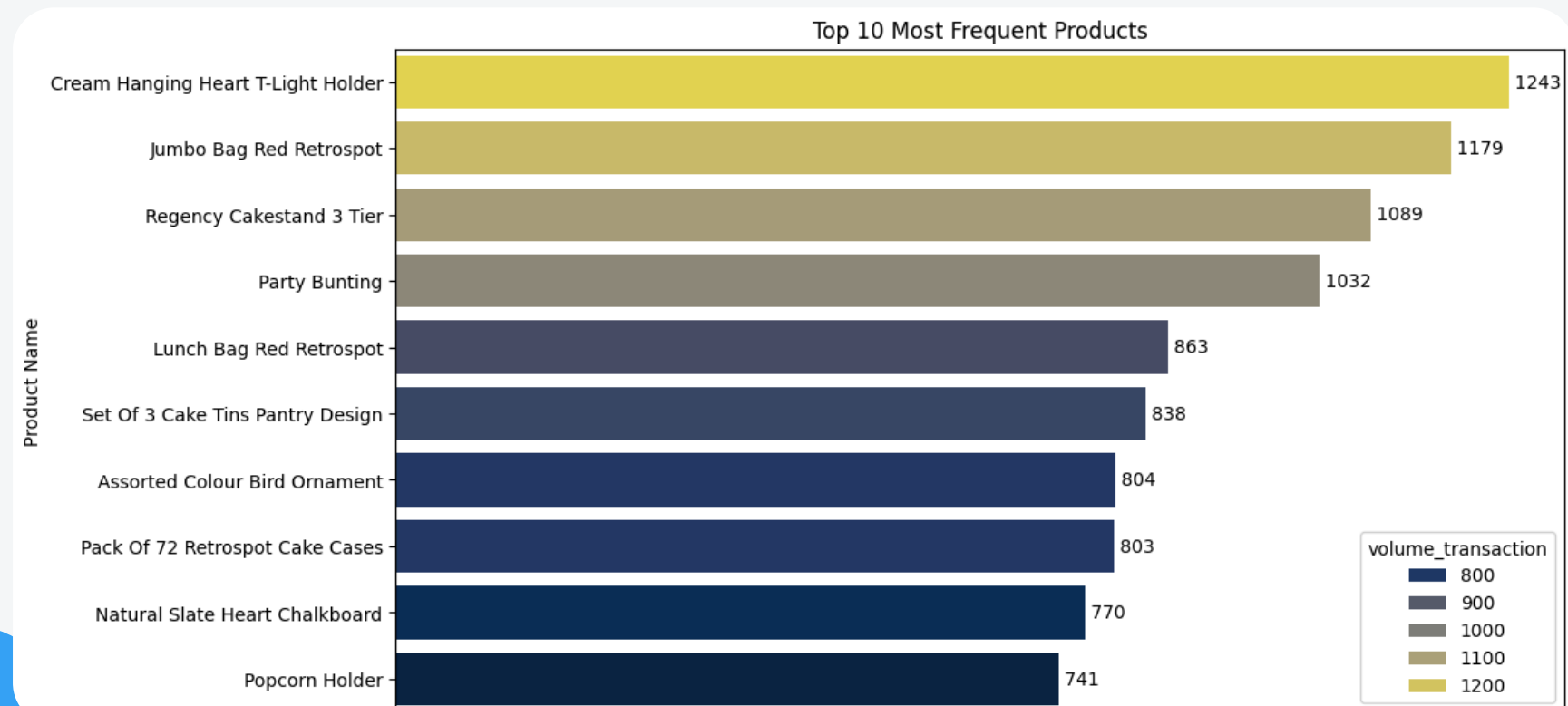
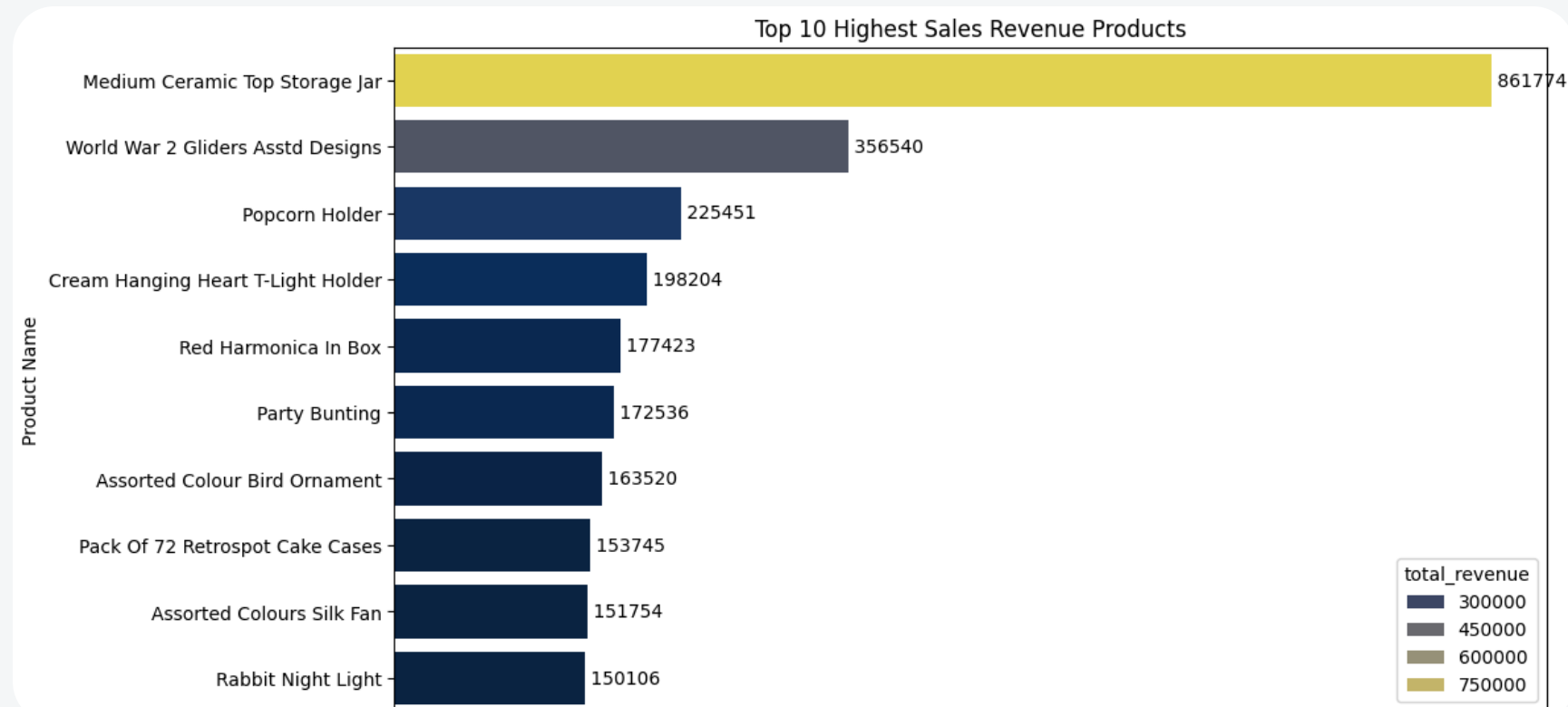
- 1 High Value (above 80th percentile)
- 2 Medium Value (20th–80th percentile)
- 3 Low Value (below 20th percentile)

What are the most profitable segment customers?

- 1 Champion segment contributes the highest revenue (\$11.98 M).
- 2 Loyal customers contribute \$9.98 M, while Regular segment contributes \$8.33.
- 3 Churned customers contribute only \$277K (0.9% of total revenue).



Top Products by Sales & Quantity

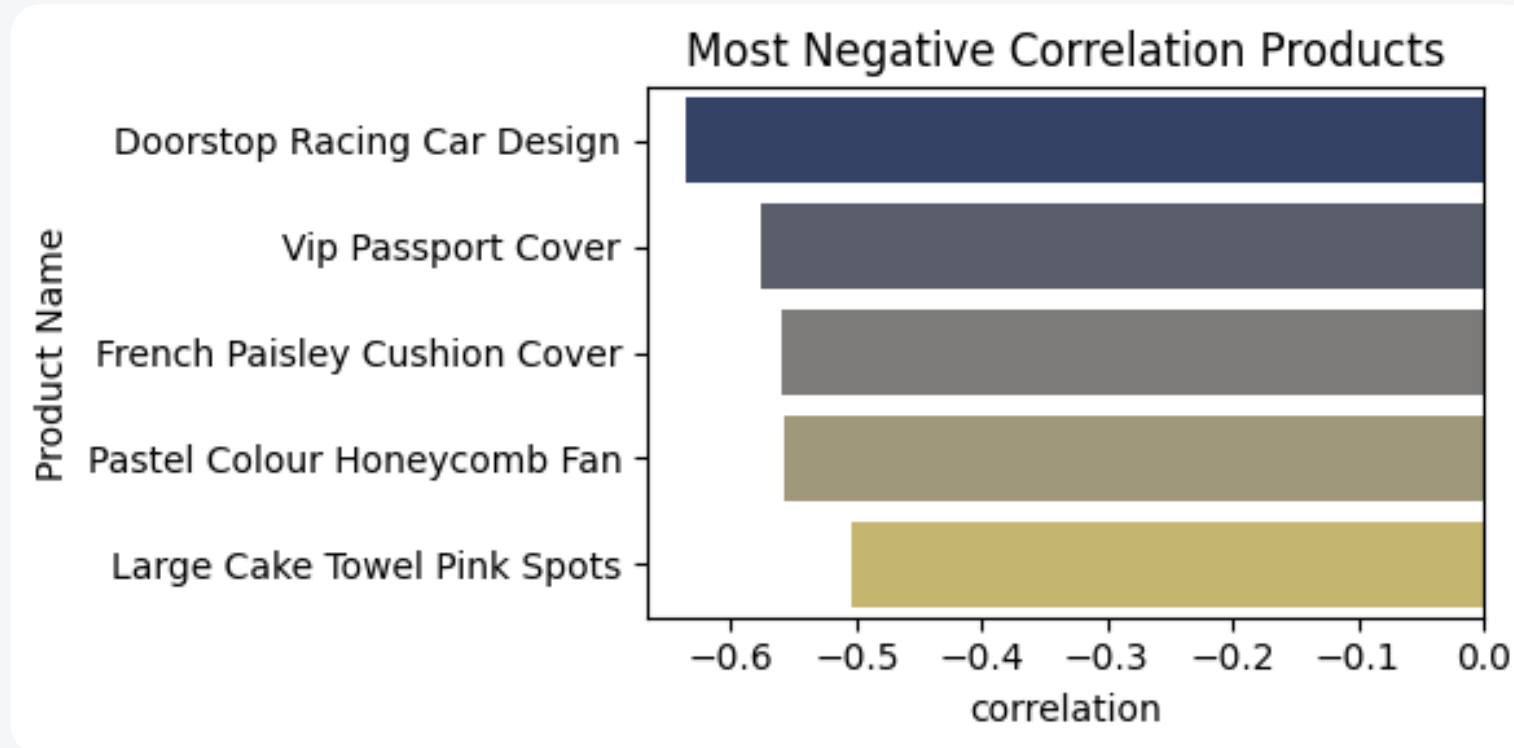


- 1 Some products appear in both high revenue and high quantity lists, indicating they are not only revenue-generating but also popular, e.g., Cream Hanging Heart T-Light Holder.
- 2 Some high-revenue products may not be frequently bought, and vice versa.
- 3 This analysis provides insight into which products contribute most to revenue and which are the most popular.

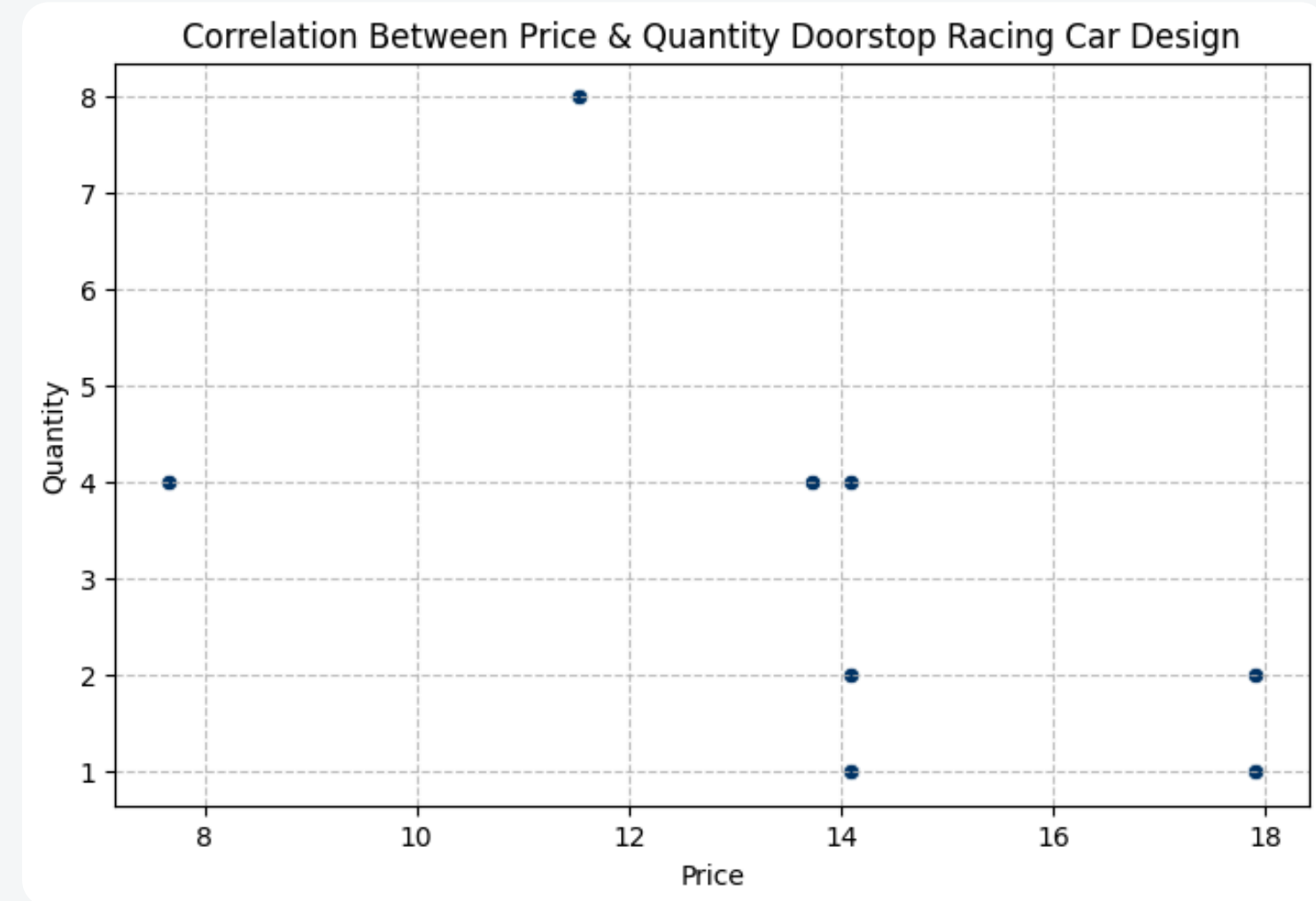
What are the most frequently purchased products?



Price Elasticity



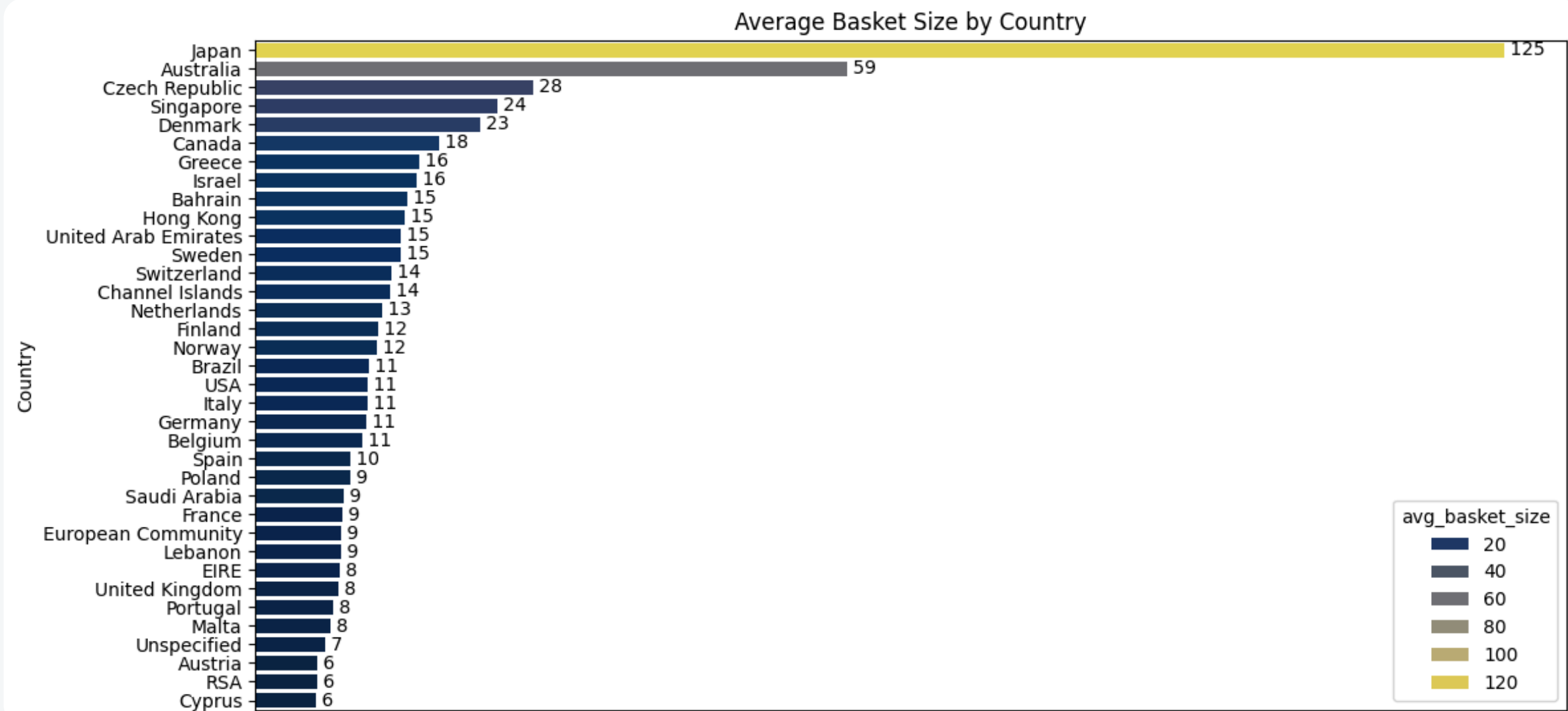
Which products most frequently experience price changes?



- Doorstop Racing Car Design had the strongest negative correlation with price.
- Followed by Vip Passport Cover, French Paisley Cushion Cover, Pastel Colour Honeycomb Fan, and Large Cake Towel Pink Spots.

- Lower prices (around \$8–\$12) tend to have higher quantities sold (4–8 units).
- As prices rise to \$14–\$18, quantity sold varies more, but many cases show low quantities (1 or 2 units).

Average Basket Size by Country



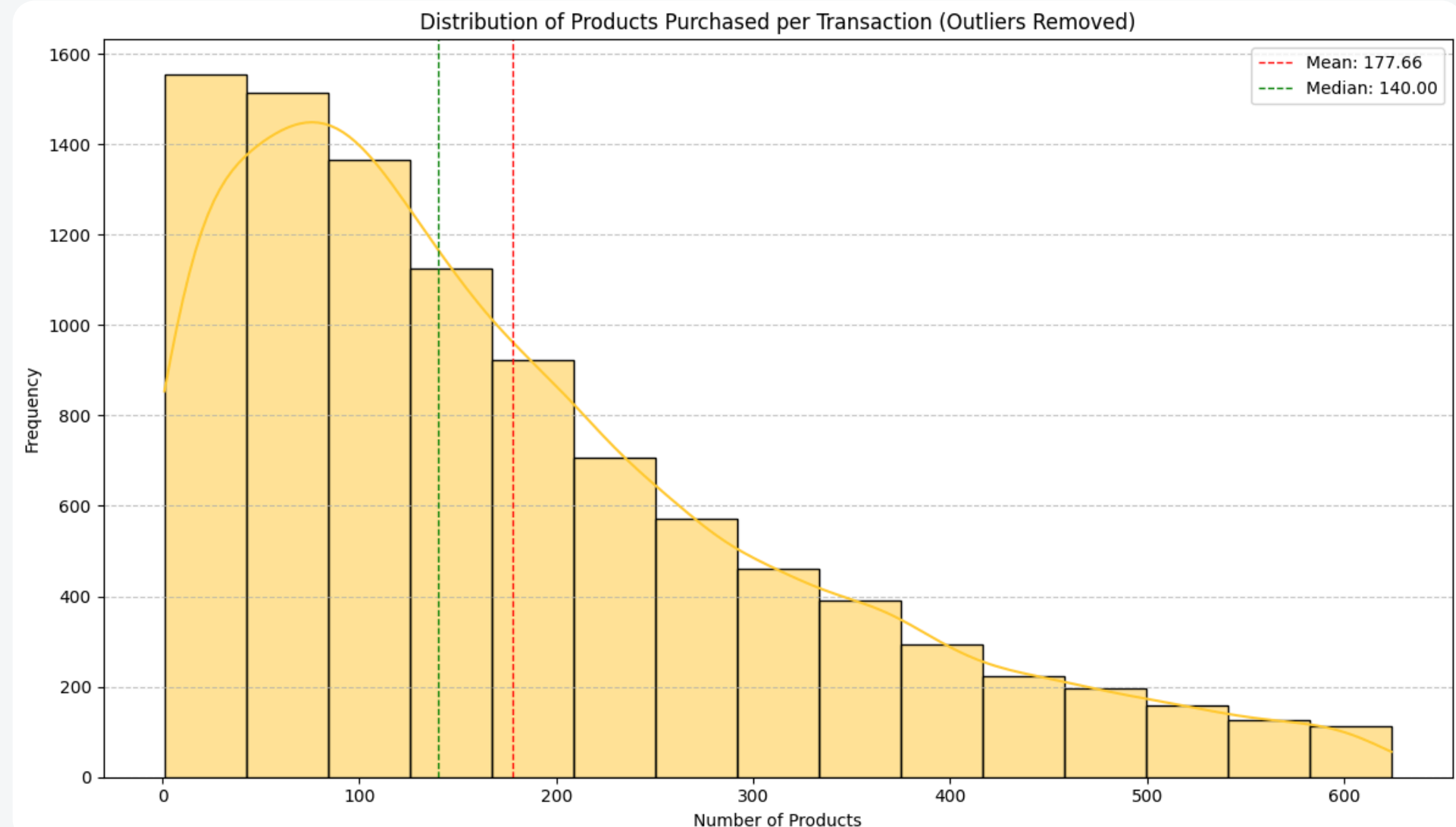
- Japan has the highest Average Basket Size with 125 products per transaction.
- Many European countries have an Average Basket Size between 12 to 28 products.
- Countries like Poland, Lebanon, and Cyprus have a Basket Size below 10 products.

Are there differences in basket size from different countries?



Distribution Average Basket Size

- Most customers purchase between 0 to 100 products per transaction.
- A few transactions involve very high quantities, indicating potential for increased upselling and cross-selling.
- Average number of products purchased per customer is 177, with a median of 140.
- Distribution is right-skewed.



How many products does the customer purchase in each transaction?



Conclusions

- 1 Sales Trend:** Sales increased at the beginning and end of the year, with significant daily fluctuations.
- 2 Customer Behavior:** New customer growth is unstable, high retention in certain months indicates effective promotional strategies.
- 3 Product Analysis:** Best-selling products are not always the most profitable, pricing influences purchase quantity.
- 4 Customer Segmentation:** Customers are segmented by spending and purchase frequency, with High Value customers as the main target for profit growth.



Business Recommendations

Action 1

Stock Optimization

Ensure availability of best-selling products.

Action 2

Promotion

Boost sales on weak days through promotions and special discounts.

Action 3

Market Segmentation

Adjustment of marketing strategies for each customer segment.

Action 4

Customer Retention

Improve retention with effective promotions and campaigns.

Action 5

Increase Customer Lifetime Value

Upselling and cross-selling strategies to boost per-customer transactions.

Action 6

Market Expansion

Penetrate countries with high market potential.

Thank you!

Have a great
day ahead.

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