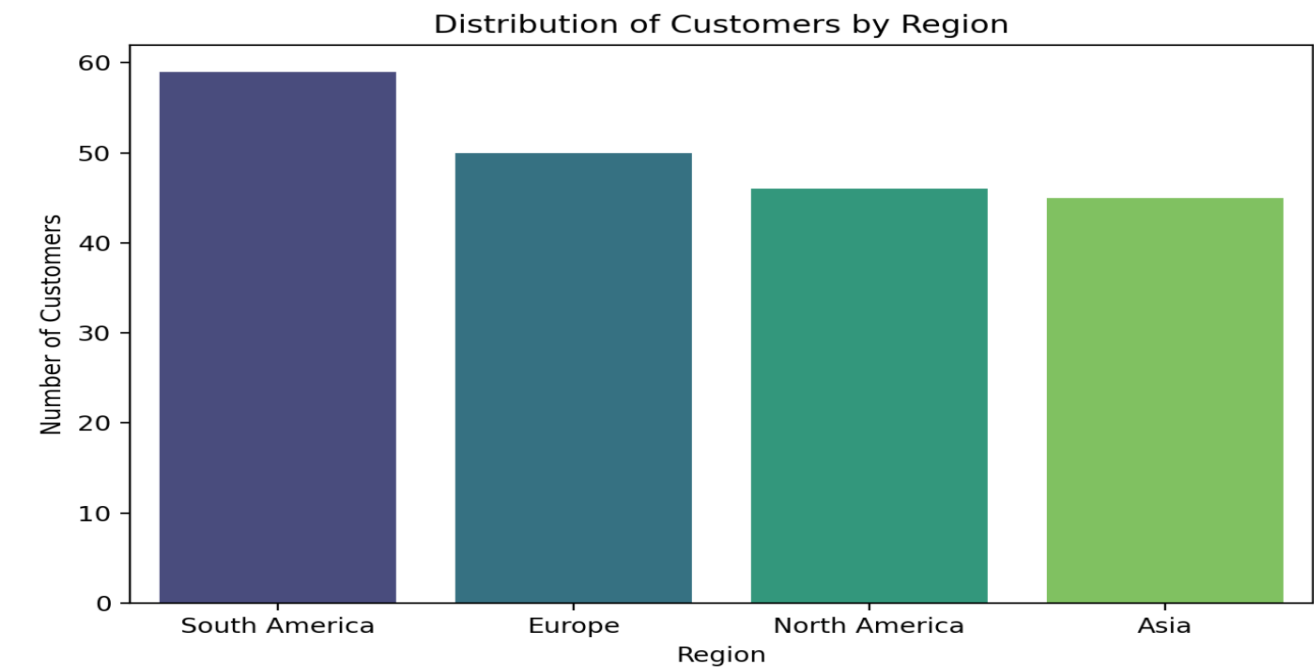# Customer Data EDA :

1. Regional Market Distribution
South America leads with the **highest customer percentage share of 29%**, followed by **Europe (25%)**, **North America (23%)**, and **Asia (22.5%)**.
This **even allocation** indicates successful global market penetration.
**Opportunity exists for focused expansion in Asia**, where the business holds the smallest market share.

2. Customer Growth Trajectory
The customer base has shown **consistent growth** from **2022 to 2024**.

- **2022**: 64 signups
- **2023**: 57 signups
- **2024**: **79 signups**, a significant surge.
  This spike in **2024 signups** highlights the success of the company's **customer acquisition strategies**.
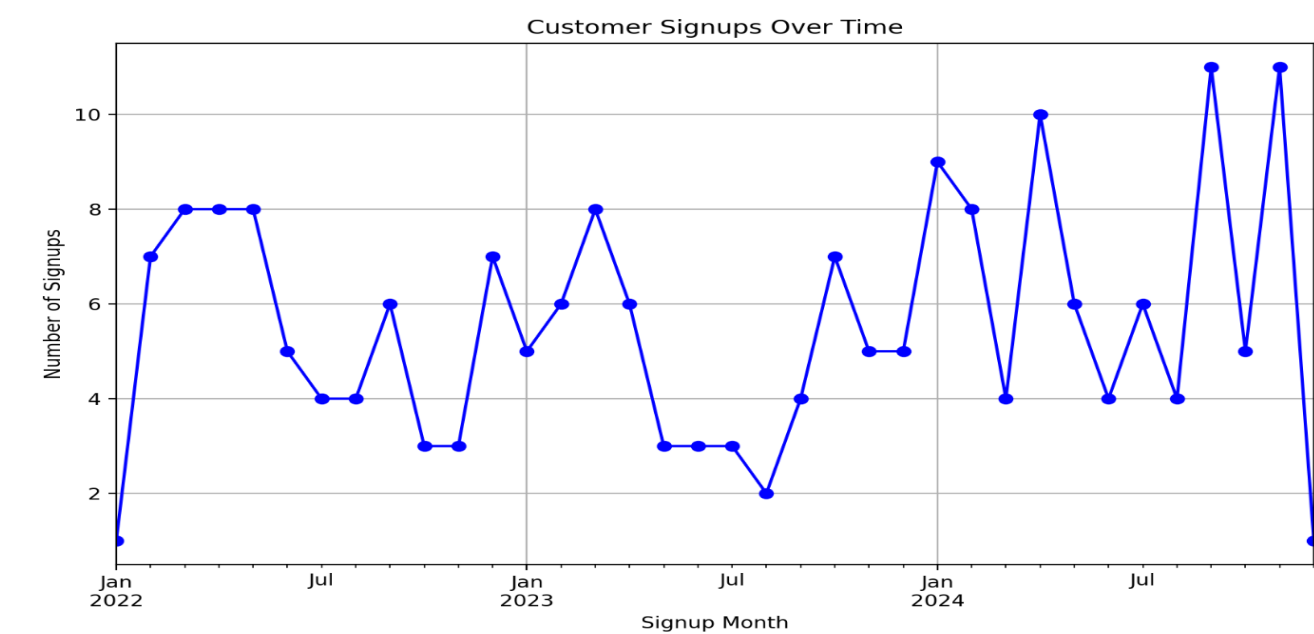
3. Customer Uniqueness

The customer base comprises **200 unique individuals**, each with a **unique CustomerID**.
The absence of repeat customers suggests:
i. **Strong retention rates**, eliminating the need for re-registration.
ii. **Potential to introduce loyalty programs** to further engage customers.

4. Temporal Signup Patterns

Signup patterns show **seasonal fluctuations**, as illustrated in the chart.
Peak signup periods can be leveraged for **targeted marketing campaigns**.
Understanding these trends will aid in **resource allocation for customer onboarding**.


Top 10 Customers by Name Frequency
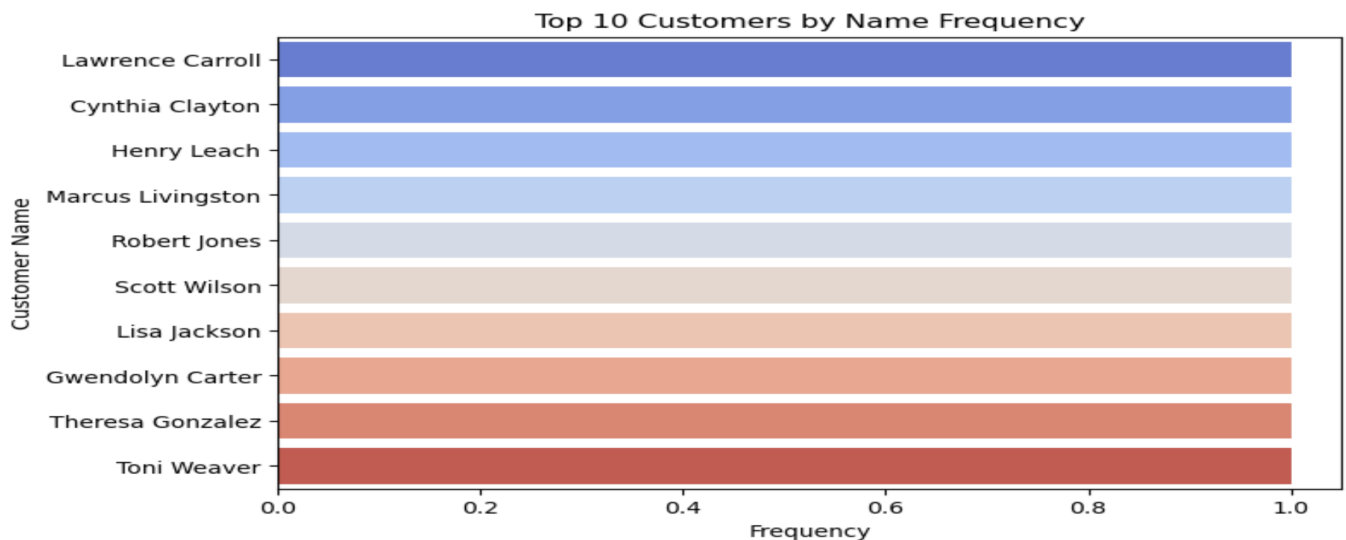
5. Geographic Expansion Potential

- The **European market** shows promising potential with an **adoption rate of 25%**.
- **South America** demonstrates a **strong presence**, but **Asia offers significant growth opportunities**.
- **North America** presents **scope for deeper market penetration**.

Product Data EDA :

Category Distribution

The product listing is quite uniform across categories, with **23 Books** and **Electronics products each**, **25 Clothing products**, and **26 Home Decor products**, indicating a **balanced inventory distribution**.
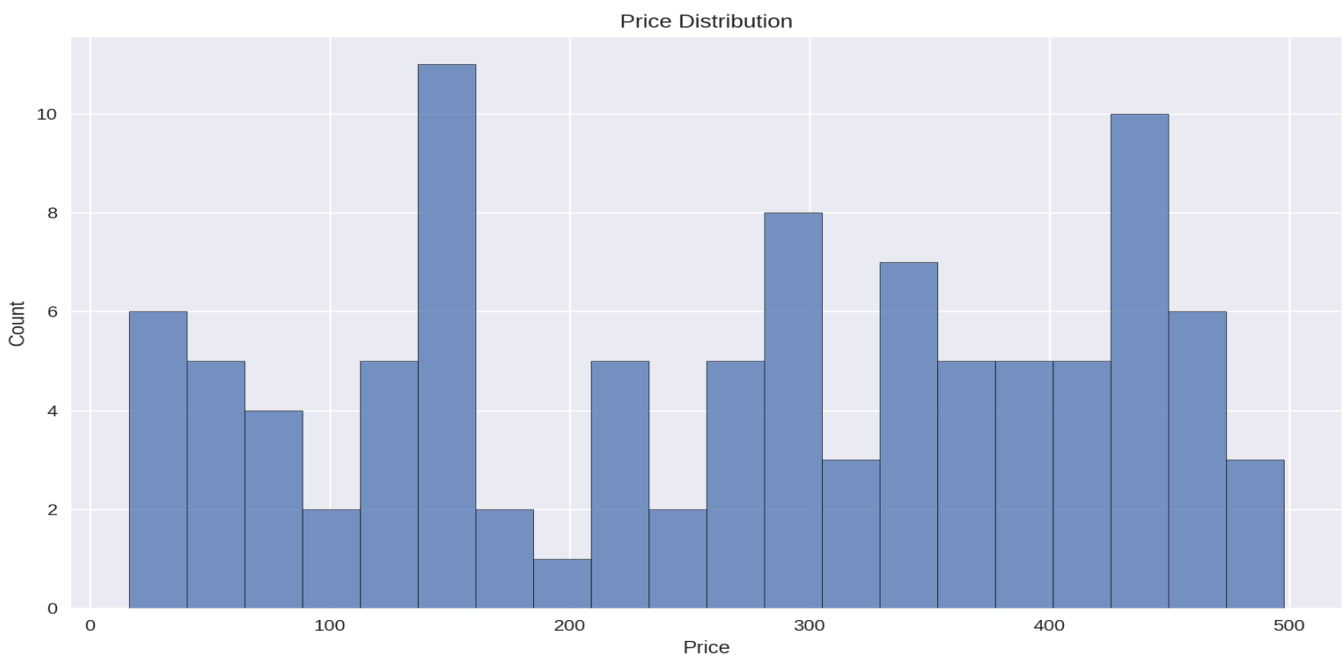

Average Price by Category
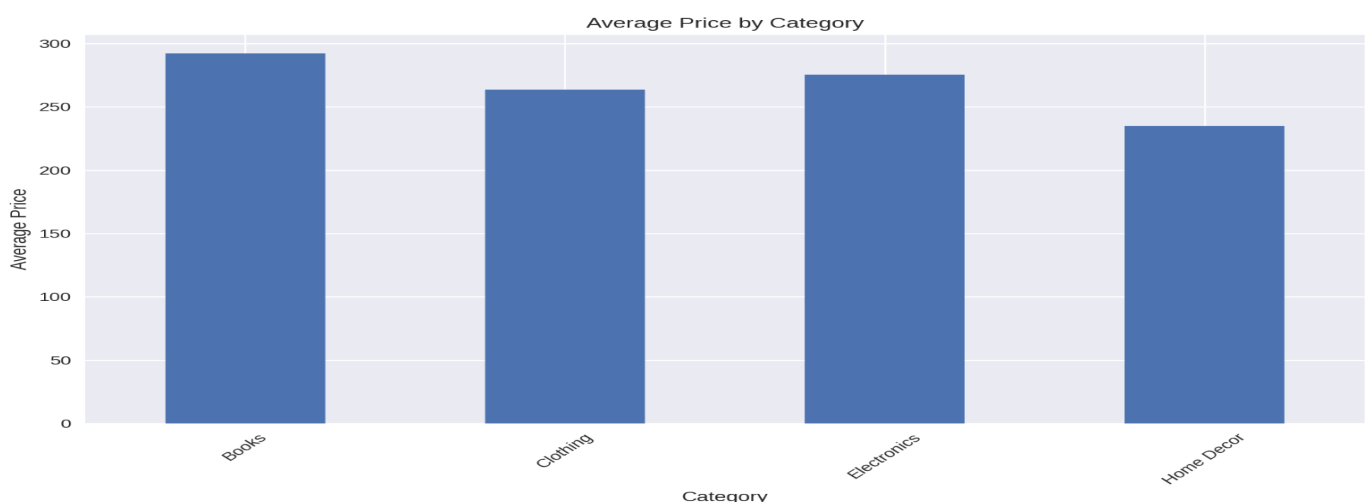
Price Variations

- **Books** have the **widest price range** from **$33.59 to $497.76**, catering to a broad spectrum of consumers, from budget to premium.
- **Electronics** show limited price variation, staying in the **mid-to-upper pricing range**, highlighting a focus on **high-end technology products**.
- **Home Decor** prices have the **largest variation**, with the **lowest average price point ($235.02)** while maintaining a **healthy price range**.
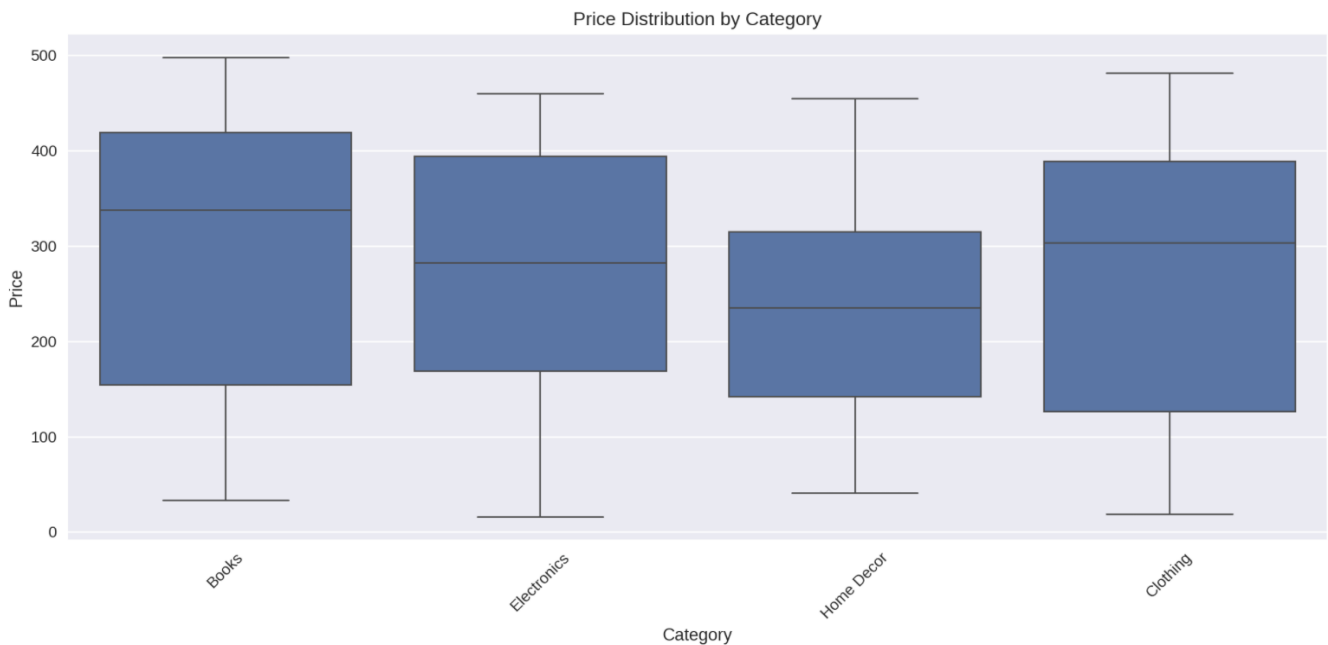
Price Distribution Analysis

- The price distribution exhibits a **bimodal pattern**, with dominant clusters around **$150 and $400**, reflecting distinct market segments for **budget and premium products**.
- A **mid-range gap ($250-350)** exists, where **product offerings are relatively fewer**, presenting an opportunity for expansion.

Category Performance

- The **Books category** has the **highest average price per sale ($292.21)**, followed by **Electronics ($275.35)**, indicating these categories drive **higher revenue per unit**.
- Despite having the **lowest average price**, the **Home Decor category** maintains a **healthy minimum price of $41.18**, ensuring **higher profit margins**.

	["Price","count"]	["Price","mean"]	["Price","min"]	["Price","max"]
Books	26	292.21	33.59	497.76
Clothing	25	263.72	18.82	481.78
Electronics	26	275.35	16.08	459.86
Home Decor	23	235.02	41.18	454.53

Strategic Pricing Insights

- The **extensive price range across all categories ($16.08 to $497.76)** suggests a **broad market target strategy**.
- Every category includes **best-selling items priced at $450 or above**, demonstrating **consistent top-end market positioning** across the product line.

Transactional Data EDA :

1. Distribution of Transaction Values
Transaction values tend not to cluster uniformly, as most transactions focus on **specific price proximities**. For this period, the **average transaction value is approximately $687**, with a **maximum of $1,323** and a **minimum of $82**. This reveals the existence of **varied product pricing strategies** and **distinct customer spending patterns**.

	Number_of_Transactions	Quantity	TotalValue	Average_Transaction_Value
count	199	199	199	199
mean	5.0251256281	12.7487437186	3467.3143718593	687.5801821245
std	2.198340021	6.1510601804	1832.6779583874	237.9366486597
min	1	1	82.36	82.36
25%	3	8.5	2162.04	542.9416666667
50%	5	12	3137.66	677.2075
75%	6	17	4770.225	828.6241666667
max	11	32	10673.87	1323.1333333333

2. Product Performance
The analysis of best-selling products identifies **product P029** as the **leading revenue earner** with total sales of **$19,513**, followed by **P079** and **P048**.
Such top-selling products consistently achieve **high sales volumes**, indicating **strong market demand** and potential for **inventory optimization**.

	Quantity	TotalValue
P029	45	19513.8
P079	43	17946.91
P048	43	17905.2
P020	38	15060.92
P062	39	14592.24
P059	46	13947.2
P039	32	13778.88
P083	30	13671.6
P019	35	13487.95
P041	29	13232.12

3. Customer Purchase Frequency
The **average customer completes 5 transactions**, with some making up to **11 purchases**.
The **top quartile of customers makes 6 or more purchases**, highlighting a **significant opportunity for customer retention strategies**.

4. Sales Trends
Revenue generation varies throughout the year, as reflected in the **monthly sales trend graph**, which shows **peaks and troughs in sales**.
This seasonality in purchasing behavior can be leveraged for **inventory planning** and **targeted marketing campaigns**.
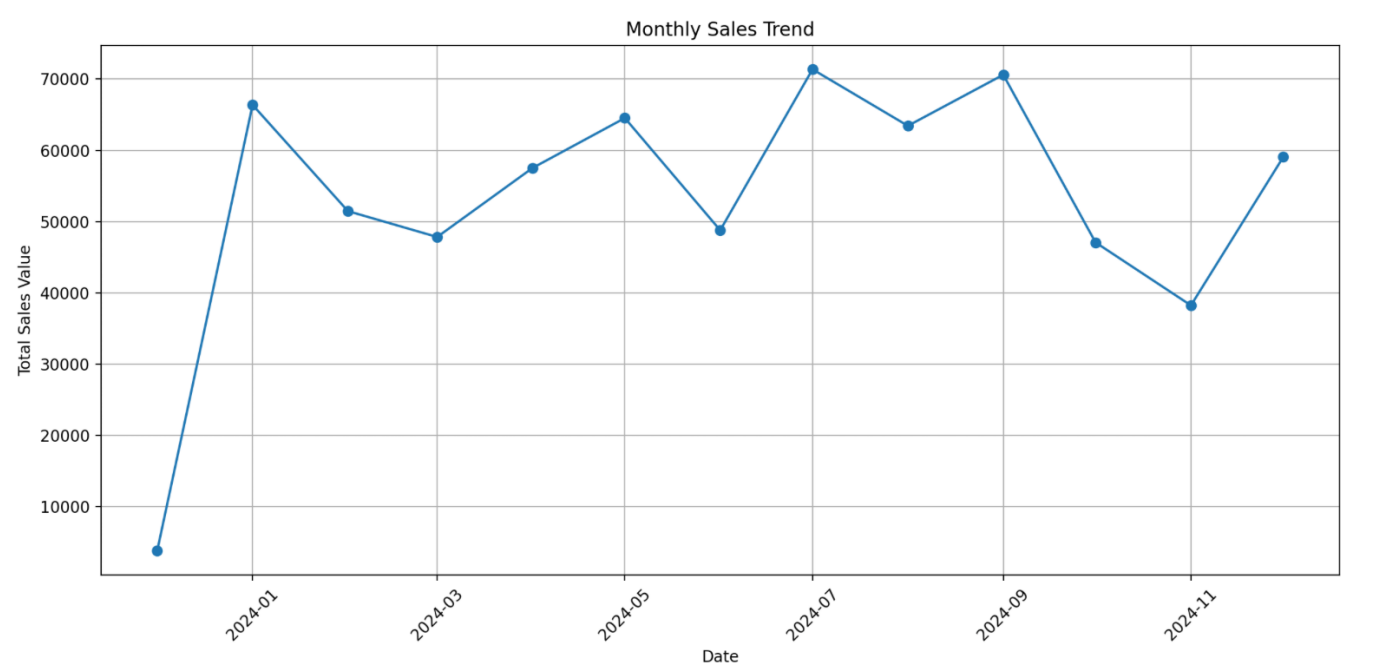
5. Purchasing Behavior Pattern

- On average, customers order **2.5 items per transaction**, with individuals typically purchasing **multiple items at once**.
- **Bundle pricing strategies** and **bulk purchase incentives** may be effective, as the **distribution of items purchased ranges from 1 to 4**.