

# Customer Segmentation Report

## 1. Introduction

This report presents the results of customer segmentation performed on the provided eCommerce dataset. The goal is to group customers into distinct clusters based on their profile and transaction behavior. The segmentation was performed using the K-Means clustering algorithm, and the results were evaluated using the Davies-Bouldin Index (DBI).

## 2. Methodology

### Data Preparation:

Merged Customers.csv and Transactions.csv to create a comprehensive dataset.  
Engineered features such as TotalSpent, PurchaseFrequency, AvgTransactionValue, and Tenure.

### Preprocessing:

Scaled numerical features using StandardScaler.  
Encoded categorical features (e.g., Region) using one-hot encoding.

### Clustering:

Applied K-Means clustering with 10 clusters.  
Reduced dimensionality using PCA to improve cluster separation.

### Evaluation:

Evaluated clustering performance using the Davies-Bouldin Index (DBI).  
Analyzed cluster characteristics to derive actionable insights.

## 3. Results

### 3.1 Clustering Metrics

Number of Clusters: 10  
Davies-Bouldin Index (DBI): 1.4569

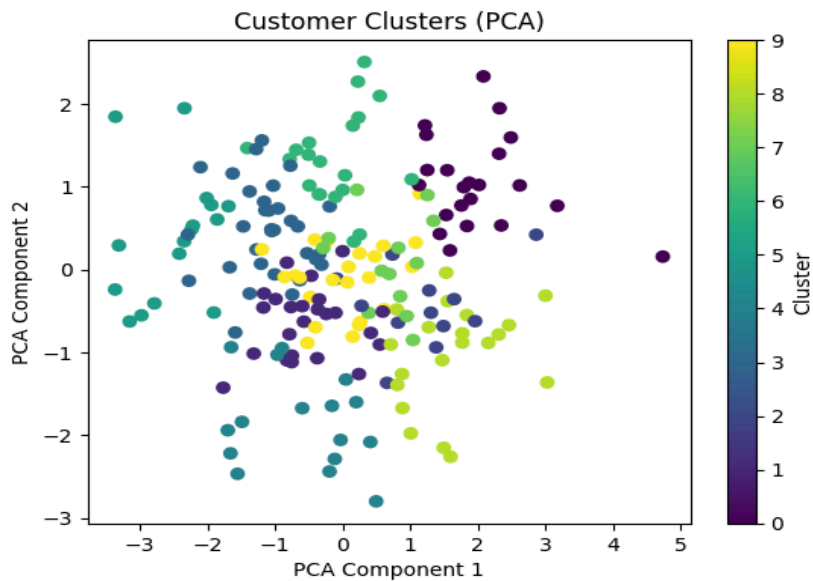
### 3.2 Cluster Characteristics

The following table summarizes the key characteristics of each cluster:

	Cluster	TotalSpent	PurchaseFrequency	AvgTransactionValue	Region
0	0	6086.011364	8.363636	730.609726	South America
1	1	2826.154583	4.500000	630.461688	South America
2	2	4940.102500	4.500000	1106.602746	South America
3	3	1996.472188	3.187500	631.349563	Europe
4	4	2426.630625	2.437500	991.220104	Asia
5	5	671.011875	2.375000	276.510594	Europe
6	6	3086.289000	5.750000	550.257768	South America
7	7	4379.285385	5.384615	815.302179	Europe
8	8	5796.247500	6.750000	873.800380	Europe
9	9	3373.480833	6.458333	532.406682	North America

### 3.3 Visualizations

Below are the visualizations of the clusters using PCA:



## 4. Insights

### Cluster 0 (South America, High Spenders):

Customers in this cluster have the highest TotalSpent (₹6086.01) and moderate PurchaseFrequency (8.36).

Actionable Insight: Target this group with premium products and loyalty programs to retain their high spending.

### Cluster 1 (South America, Moderate Spenders):

Customers in this cluster have moderate TotalSpent (₹2826.15) and low PurchaseFrequency (4.50).

Actionable Insight: Encourage repeat purchases through discounts and personalized offers.

### Cluster 2 (South America, High-Value Purchases):

Customers in this cluster have the highest AvgTransactionValue (₹1106.60) but moderate TotalSpent (₹4940.10).

Actionable Insight: Focus on upselling high-value products to this group.

### Cluster 3 (Europe, Low Spenders):

Customers in this cluster have low TotalSpent (₹1996.47) and PurchaseFrequency (3.19).

Actionable Insight: Introduce budget-friendly products and promotions to increase engagement.

### Cluster 4 (Asia, Moderate Spenders):

Customers in this cluster have moderate TotalSpent (₹2426.63) and low PurchaseFrequency (2.44).

Actionable Insight: Increase purchase frequency through targeted marketing campaigns.

### Cluster 5 (Europe, Low Spenders):

Customers in this cluster have the lowest TotalSpent (₹671.01) and PurchaseFrequency (2.38).

Actionable Insight: Focus on re-engaging these customers with special offers.

### Cluster 6 (South America, Moderate Spenders):

Customers in this cluster have moderate TotalSpent (₹3086.29) and PurchaseFrequency (5.75).

Actionable Insight: Offer bundle deals to increase transaction value.

### Cluster 7 (Europe, High Spenders):

Customers in this cluster have high TotalSpent (₹4379.29) and moderate PurchaseFrequency (5.38).

Actionable Insight: Retain these customers with exclusive perks and early access to new products.

### Cluster 8 (Europe, High Spenders):

Customers in this cluster have high TotalSpent (₹5796.25) and PurchaseFrequency (6.75).

Actionable Insight: Focus on building long-term relationships with these high-value customers.

### Cluster 9 (North America, Moderate Spenders):

Customers in this cluster have moderate TotalSpent (₹3373.48) and PurchaseFrequency (6.46).

Actionable Insight: Increase spending through cross-selling and personalized recommendations.

## **5. Conclusion**

The customer segmentation analysis successfully grouped customers into 10 distinct clusters based on their spending behavior and demographics. The Davies-Bouldin Index (DBI) of 1.456 indicates reasonable cluster separation, though there is room for improvement. The insights derived from this analysis can help the company tailor its marketing strategies to different customer segments, ultimately driving revenue growth and customer satisfaction.