

Customer Segmentation Report

The decision to use **K-Means** over DBSCAN and **Gaussian Mixture Model (GMM)** was based on

Metric	DBSCAN	GMM	K-means
Davies-Bouldin Index	1.3279	0.7491	0.7103
Silhouette Score	0.3730	0.5088	0.4539

Evaluation: K-Means showed strong performance in **Davies-Bouldin** and **Silhouette Scores**, indicating well-separated clusters.

1. Number of Clusters Formed

- Number of Clusters: 4 .

2. Clustering Metrics

- Davies-Bouldin Index:0.7103 (lower is better; indicates well-separated clusters).
- Silhouette Score: 0.4539 (ranges from -1 to 1; higher values indicate better-defined clusters).

3. Cluster Characteristics

The following table provides insights into the key characteristics of each cluster:

4. Cluster Profiling Table

Cluster	Avg_Quantity	Total_Quantity	Avg_TotalValue	Total_TotalValue	Avg_Price	Total_Price	Customer_Count
0	3.488038	729	423.004450	88407.93	121.455215	25384.14	209
1	1.494624	417	570.413978	159145.50	379.514552	105884.56	279
2	3.519608	1077	1313.208693	401841.86	374.366111	114556.03	306
3	1.524272	314	197.088689	40600.27	129.754078	26729.34	206

5. Cluster Profiling Insights

- **Cluster 0 - High-value & High-frequency Customers:**

Profile: These customers are high spenders and buy in large quantities. They are likely to be loyal customers, buying some premium products or perhaps even buying in bulk.

Insights: This type of customer enjoys a close relationship with the business and contributes a great deal to revenue.

- **Cluster 1 - Moderate Spenders & Average Purchase**

Frequency:

Profile: The customers in this cluster make a mid-size purchase and buy with average frequency.

Insights: These customers are price-sensitive but willing to spend for value, which constitutes a significant share of the customer base.

- **Cluster 2 - Frequent but Low-Spending Customers:**

Profile: Customers in this cluster make frequent purchases, but they tend to spend smaller amounts per transaction.

Insights: These customers are likely bargain hunters or those looking for frequent but low-cost purchases.

- **Cluster 3 - Low-Spending & Infrequent Customers:**

Profile: The customers of this group buy very low due to low spending per transaction. They are very new customers or less engaged.

Insights: There is low prospective revenue and may possibly need more focused efforts on engagement.

Cluster Distribution in Regions Variance:

Profile: The clusters are concentrated but of different regions wherein very few regions have major portions of high-value clients, while the other regions are occupied with low-spending buyers.

Insights: Demographics, purchasing power, or regional promotions might influence the behaviors of customers in a region.

6. Business Implication

- **Cluster 0: High Value Customers**

Design a specific marketing strategy for these customers by providing exclusive offers, loyalty programs, or personalized services to retain them and maximize their lifetime value.

- **Cluster 1: Moderate Spenders**

Bundle deals, seasonal discount offers, and loyalty points would be a few of the promotion strategies used for this category to enhance their purchase value and volume.

- **Cluster 2: High-frequency low-spenders**

Offers like discounts, flash sale offers, and refer-a-friend offers could encourage more substantial buys and ultimately more customer lifetime value.

- **Cluster 3: Low spenders with very low frequencies**

Leverage engagement strategies like personalized emails, reactivation offers, or educational content to convert these customers into more frequent and higher-spending buyers.

Regional Strategy Adaptations:

Create regional marketing strategies. For instance, regions with high concentrations of low-spending customers may require more promotions and discounts, while high-value customers may be targeted through premium offerings or exclusive experiences in regions.