1. Objective:

The objective of this analysis was to segment customers into distinct clusters based on their profiles and transaction behavior. The goal was to understand customer patterns and group them meaningfully to enable targeted business strategies.

2. Clustering Algorithm:

Algorithm Used: K-Means Clustering.

Number of Clusters Evaluated: Ranged from 2 to 10 clusters.

Evaluation Metric: Davies-Bouldin (DB) Index.

The DB Index evaluates the compactness and separation of clusters. Lower values indicate better-defined clusters.

3. Results:

Optimal Number of Clusters: {9}

Davies-Bouldin Index (DB Index):

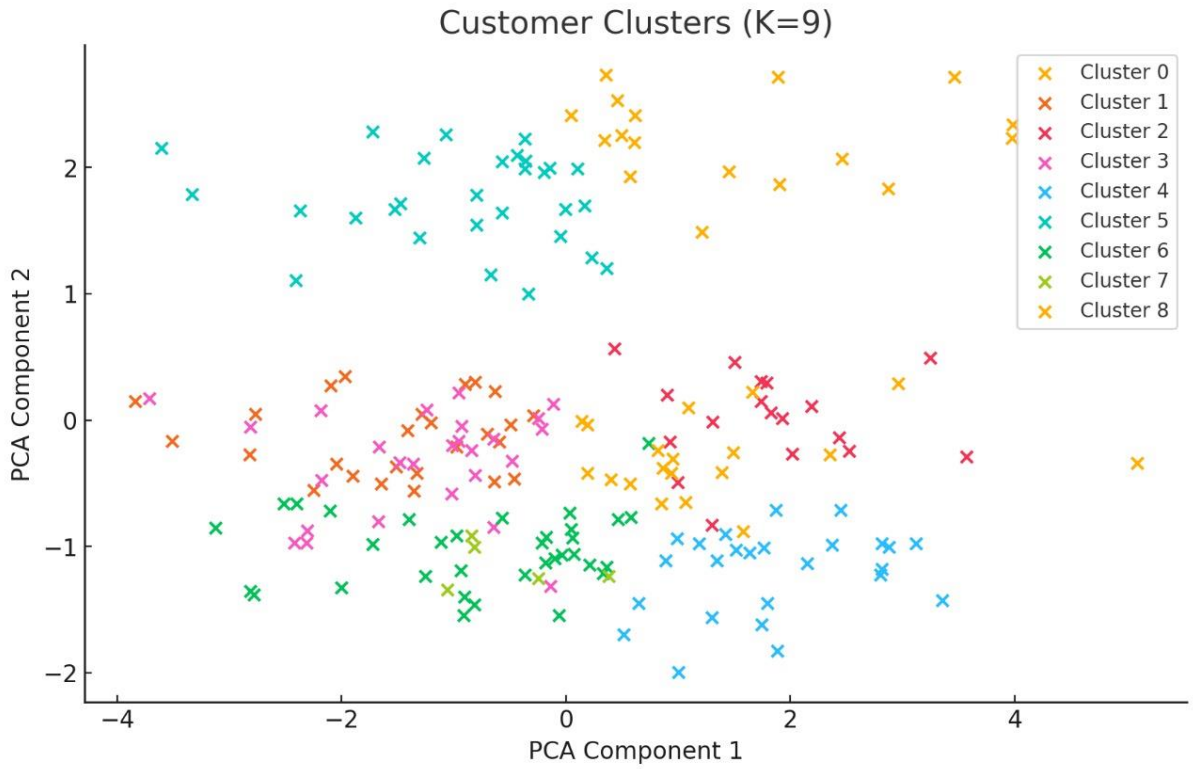
Cluster Characteristics:

- Total and average spending.
- Total quantity and product diversity.
- Regional distribution (one-hot encoded).

Each cluster captures unique customer behavior and purchasing patterns.

4. Visualization:

A scatterplot of clusters was generated using PCA (Principal Component Analysis) for dimensionality reduction. The plot displays the clusters in two dimensions, revealing distinct separations between customer groups.



5.Recommendations:

Based on clustering:

I. Targeted Marketing:

High-spending clusters can be targeted for premium products or loyalty programs.

II. Product Diversity:

Clusters with high product diversity indicate customers open to cross-category promotions.

III. Regional Campaigns:

Regional segmentation provides insights for location-specific campaigns.