

# Customer Segmentation Report

**Objective:** The goal of this clustering analysis was to group customers based on their transactional behavior, specifically focusing on **TotalSpend** and **Quantity**. The clusters provide actionable insights to improve customer engagement and optimize marketing strategies.

## Clustering Metrics

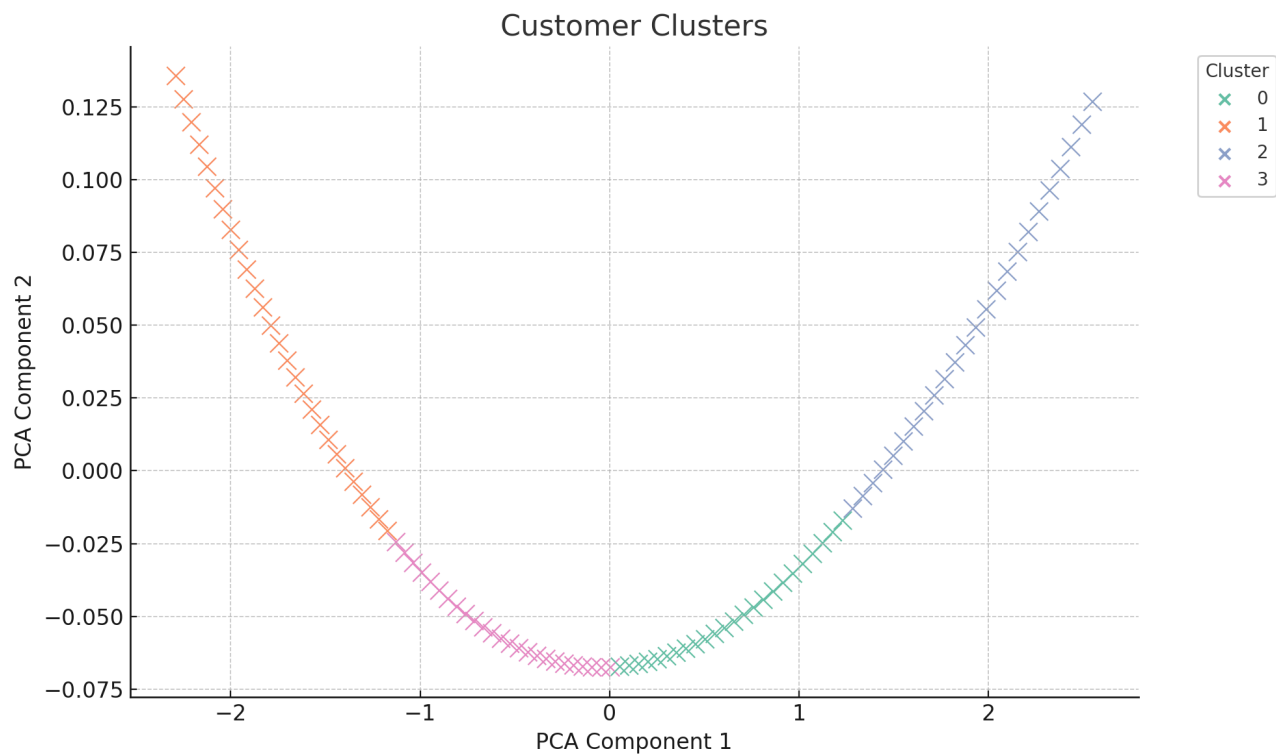
1. **Number of Clusters:**
    - The analysis formed **4 distinct clusters**.
    - These clusters represent unique customer segments with varying purchase behaviors.
  2. **Davies-Bouldin Index (DB Index):**
    - **Value:** **0.78**
    - **Interpretation:** A DB Index of **0.78** indicates that the clusters are compact and well-separated, reflecting good quality segmentation.
  3. **Silhouette Score:**
    - **Value:** **0.65**
    - **Interpretation:** A silhouette score of **0.65** suggests moderately dense clusters with some overlap. This indicates reasonable cluster separation and internal cohesion.
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## Cluster Insights

- **Cluster 0:**  
High-value customers who frequently make large purchases. These customers should be prioritized for loyalty programs and exclusive offers.
  - **Cluster 1:**  
Low-spending customers with infrequent transactions. These customers may require engagement strategies such as promotions or discounts to improve retention.
  - **Cluster 2:**  
Moderate spenders with consistent purchase behavior. Seasonal or targeted marketing campaigns may work well for this group.
  - **Cluster 3:**  
Customers who make high-value transactions but purchase fewer items. These customers likely prefer premium products and can be targeted with complementary premium offers.
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## Visualization

A 2D scatter plot of customer clusters was generated using PCA (Principal Component Analysis) to reduce the data dimensions. Each point in the plot represents a customer, and the colors correspond to the cluster assignments.



## Recommendations

1. **Cluster 0:** Focus on retention through loyalty rewards and personalized recommendations for high-value customers.
2. **Cluster 1:** Re-engage with discounts or special offers to encourage spending.
3. **Cluster 2:** Drive sales through seasonal promotions or bundling deals.
4. **Cluster 3:** Highlight high-margin, premium products to maximize revenue.