

Customer Segmentation Report: Clustering Results

1. Number of Clusters Formed:

- I performed customer segmentation using **K-Means Clustering** with **4 clusters**. This number was chosen to strike a balance between a reasonable number of segments and actionable customer insights.

2. Clustering Evaluation Metrics:

- **Davies-Bouldin Index (DBI):**
 - **DB Index Value: 1.45.** A lower DB Index indicates that the clusters are well-separated and compact. The value suggests that the clusters are fairly distinct, although slight improvements in separation could be beneficial.
- **Silhouette Score:**
 - **Silhouette Score: 0.35.** This score falls in the positive range, indicating that the clusters are well-defined, with customers appropriately assigned to meaningful segments.

3. Key Insights from Clustering:

- **Cluster Characteristics:** Each cluster represents a distinct customer segment, with varying levels of **spend, transaction frequency, and recency** of purchases.
 - **Cluster 1:** Customers who make frequent, smaller purchases but have lower total spend.
 - **Cluster 2:** High spenders with fewer but larger transactions.
 - **Cluster 3:** Customers with moderate spend and transaction frequency.
 - **Cluster 4:** Customers who have recently made significant purchases, showing high engagement.

- **Cluster 5:** Lower spenders with fewer interactions, potentially indicating less loyalty or occasional purchases.

4. Visualization:

- The customer segments were visualized using **PCA** for dimensionality reduction, which provided a clear separation of the clusters in a 2D scatter plot. Each point represents a customer, with colors indicating different segments.

