



### Clustering Technique:

- The flexibility to choose between 2 to 10 clusters was utilized, and after analyzing the clustering metrics, **5 clusters** were selected as the optimal number.

### Evaluation Metrics:

#### 1. Davies-Bouldin Index (DB Index):

- The DB Index value was **0.85**, indicating a well-separated and compact clustering result.
- Lower DB Index values suggest better clustering performance.

#### 2. Silhouette Score:

- The Silhouette Score was **0.46**, indicating moderate cluster cohesion and separation.

## Cluster Summary

The segmentation results are summarized below:

Cluster	Mean Total Spend	Median Total Spend	Mean Transaction Count	Median Transaction Count	Customer Count
Cluster 0	\$5,824.30	\$5,690.76	8.15	8	26
Cluster 1	\$4,178.60	\$3,850.94	5.63	5	51
Cluster 2	\$2,855.82	\$2,898.73	4.65	5	40
Cluster 3	\$3,119.41	\$3,071.46	4.48	5	48
Cluster 4	\$1,756.87	\$1,862.74	2.86	3	35

## Insights from the Clustering Results

### 1. Cluster Characteristics:

- **Cluster 0:**
  - Highest mean total spend (\$5,824.30) and transaction count (8.15).
  - Represents high-value customers who make frequent purchases.
- **Cluster 1:**
  - Moderate spend (\$4,178.60) with slightly fewer transactions (mean of 5.63).
  - Likely medium-value customers with consistent purchasing patterns.

- **Cluster 2:**
  - Lower spend compared to Cluster 1 (\$2,855.82) but similar transaction count (4.65).
  - Represents customers with moderate engagement.
- **Cluster 3:**
  - Total spend (\$3,119.41) is slightly higher than Cluster 2, but the transaction count is similar (4.48).
  - May include customers with selective purchasing habits.
- **Cluster 4:**
  - Lowest total spend (\$1,756.87) and transaction count (2.86).
  - Represents low-value or infrequent customers.

### **Implications:**

- **High-Value Customers (Cluster 0):**
  - Prioritize retention strategies like loyalty programs and exclusive offers.
- **Medium-Value Customers (Clusters 1 & 2):**
  - Upsell and cross-sell opportunities to increase engagement and revenue.
- **Low-Value Customers (Cluster 4):**
  - Identify pain points and create targeted campaigns to drive more purchases.



- **Targeted Marketing:** The segmentation can be used to create targeted marketing campaigns for each customer segment. For example, the company can tailor marketing messages and offers to the specific needs and preferences of customers in each cluster.
- **Product Development:** The segmentation can inform product development decisions. By understanding the characteristics of each customer segment, the company can develop products and services that cater to their specific needs and preferences.
- **Customer Service:** The segmentation can be used to improve customer service by providing personalized support and experiences to customers in each segment.

#### Further Analysis:

- **Cluster Characteristics:** Investigating the characteristics of customers within each cluster can provide valuable insights into their demographics, behavior, and preferences.
- **Business Impact:** Analyzing the revenue and profitability of each customer segment can help determine the business value of each segment.
- **Segmentation Refinement:** The segmentation can be further refined by incorporating additional customer data and using more sophisticated clustering algorithms.