

Task 3: Customer Segmentation Report

Number of Clusters Formed

- **10 clusters** were formed as determined by the optimal Davies-Bouldin Index.

Davies-Bouldin Index (DB Index)

- **DB Index Value:** 0.723
- A lower DB Index indicates better clustering. The achieved value demonstrates well-separated clusters.

Cluster Distribution

- Cluster sizes:
 - Cluster 0: 36 customers
 - Cluster 7: 37 customers (largest cluster)
 - Clusters 1, 4, and 8: Smallest clusters with fewer than 12 customers each.

Other Relevant Clustering Metrics

- **Cluster Cohesion:** Clear separation is observed in the PCA visualization, indicating well-defined customer segments.
- **Cluster Size Variation:** Some clusters are significantly larger than others, hinting at diverse customer behaviors within the dataset.

Recommendations Based on Clusters

1. **High-Value Clusters:** Analyze spending habits in clusters with high average total spending (e.g., Clusters 0 and 7) to personalize offers.
2. **Low-Engagement Clusters:** Focus marketing efforts on smaller clusters with low spending to increase engagement.
3. **Product Preferences:** Use category purchase trends within each cluster to design targeted promotions and inventory strategies.

Visualization

- The 2D PCA visualization highlights distinct cluster separations, aiding in the identification of customer groupings.
- Clusters align well with key behavioral attributes such as spending and product preferences.

