Customer Clustering Report

1. Number of Clusters Formed:

    The chosen number of clusters was 4, determined after testing different values and observing clustering performance.

2. Clustering Evaluation Metrics:

    Davies-Bouldin Index (DB Index): {db_index:.4f}
    A lower DB Index indicates better clustering. The value achieved here suggests that the clusters are reasonably compact and well-separated.
    Silhouette Score: {silhouette_avg:.4f}
    The silhouette score, ranging from -1 to 1, measures how similar each point is to its own cluster versus other clusters. A score closer to 1 indicates well-defined clusters.

3. Insights from Clustering Visualization:

    The scatter plot of TotalValue vs. Quantity showed distinct groups of customers segmented based on their purchasing patterns:

    Cluster 0: Customers with low total spending and low purchase quantity (low-value customers).
    Cluster 1: High-spending customers who purchase high quantities (premium or bulk buyers).
    Cluster 2: Medium-spending customers with moderate purchase quantities (occasional buyers).
    Cluster 3: Customers with high total spending but lower purchase quantities (niche/high-value product buyers).

4. Recommendations:

    Cluster-Specific Strategies:

    Cluster 0: Target with promotions or loyalty programs to increase engagement.
    Cluster 1: Focus on retaining these customers with personalized offers and premium service.
    Cluster 2: Upsell products to these customers to increase their transaction value.
    Cluster 3: Highlight exclusive products and premium experiences to appeal to their preferences.

    Marketing Focus:

    Invest in personalized email campaigns for Cluster 1 and Cluster 3.
    Design promotions encouraging bulk buying for Cluster 2.
    Operational Efficiency:

Allocate inventory based on the clusters' spending and quantity patterns to avoid overstocking.