TASK 3: Clustering Report

Clustering Overview

- **Number of Clusters**: 4

- **Evaluation Metric**: Davies-Bouldin Index (Moderate cluster quality as DB Index was calculated earlier to be 0.85).

- **Key Characteristics of Clusters**:

  - Total spending (TotalValue).

  - Purchase quantity (Quantity).

  - Average price of purchased products (Price).

Cluster Descriptions

1. **Cluster 0: High-Quantity, Moderate-Spending Customers**

   - **Average Total Spending**: $4,764.76.

   - **Total Quantity Purchased**: 816.

   - **Average Price per Product**: $248.97.

   - **Characteristics**:

     - Customers in this cluster purchase products in large quantities at a moderate price range.

     - Likely to be bulk buyers (e.g., retailers or businesses).

Recommendation:

   - Offer volume discounts or loyalty rewards to encourage sustained high-volume purchases.

2. **Cluster 1: Moderate-Spending, Price-Focused Customers**

   o **Average Total Spending**: $2,777.74.

   o **Total Quantity Purchased**: 590.

   o **Average Price per Product**: $323.03.

   o **Characteristics**:

      ▪ Customers buy fewer products but prefer higher-priced items.

      ▪ Focused on quality rather than quantity.

Recommendation:

   o Promote premium or exclusive products tailored to these customers.

   o Introduce bundled offers or early-access deals to maximize value perception.

3. **Cluster 2: Low-Spending, Price-Sensitive Customers**

   o **Average Total Spending**: $1,893.29.

   o **Total Quantity Purchased**: 554.

   o **Average Price per Product**: $201.22.

   o **Characteristics**:

      ▪ Customers in this cluster make infrequent purchases at lower price points.

      ▪ Highly price-sensitive and budget-conscious.

Recommendation:

   o Target these customers with personalized discounts and budget-friendly products.

o Use email campaigns with coupon codes or promotional offers.

4. **Cluster 3: High-Spending, Premium Customers**

- **Average Total Spending: $6,243.28.**

- **Total Quantity Purchased: 577.**

- **Average Price per Product: $328.63.**

- **Characteristics:**

  o **These are high-value customers who spend significantly on premium products.**

  o **Likely to be loyal customers with regular purchases.**

Recommendation:

- **Focus retention efforts with VIP programs and exclusive loyalty benefits.**

- **Provide early access to new premium products and concierge services.**

Conclusion

- The **DB Index of 1.12** reflects moderate clustering quality with clear groupings but some overlap between clusters.

- The segmentation provides actionable insights into customer behaviour:

  o Reward high-volume buyers in **Cluster 0**.

  o Enhance the experience for premium buyers in **Cluster 1** and **Cluster 3**.

  o Re-engage price-sensitive customers in **Cluster 2** with affordable options.

To improve clustering quality, consider:

- Additional feature engineering (e.g., purchase frequency, region).

- Experimenting with advanced clustering algorithms like DBSCAN or hierarchical clustering.