

## **Task 3:**

### **1. Number of Clusters Formed**

After analysing customer data, the optimal number of clusters identified is **4**. This means that the customers have been grouped into four distinct segments based on their spending behaviour and purchase patterns.

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### **2. Davies-Bouldin Index (DB Index) Value**

The Davies-Bouldin Index, which measures the quality of clustering by evaluating how well the clusters are separated and compact, resulted in a score of **0.75**. A lower DB Index indicates better-defined clusters, suggesting that the segmentation provides meaningful groupings.

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### **3. Other Clustering Metrics**

- **Silhouette Score:**

The silhouette score, which helps assess how well the customers fit into their respective clusters, came out to be **0.58**. A score closer to 1 indicates that the clusters are well-formed and distinct.

- **Cluster Distribution:**

The number of customers in each cluster is distributed as follows:

- **Cluster 0:** 50 customers
- **Cluster 1:** 65 customers
- **Cluster 2:** 45 customers
- **Cluster 3:** 40 customers

The distribution shows a balanced segmentation, ensuring no cluster is overly dominant or too small.

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### **4. Key Observations from the Clustering Analysis**

#### **1. Customer Spending Behaviour:**

- Some customers (Cluster 1) have high spending patterns but purchase less frequently, making them ideal candidates for premium offers or loyalty programs.

- Other segments (Cluster 0) shop more frequently but tend to make moderate-value purchases, indicating they may respond well to promotions and discounts.

## **2. Business Opportunities:**

- Targeted marketing campaigns can be designed for each group to encourage more purchases.
- The clusters provide a clear opportunity to personalize promotions based on buying habits and spending capabilities.

## **3. Regional Insights:**

- The clustering analysis also highlighted variations in purchasing trends across different regions, which can help tailor region-specific marketing strategies.

## **4. Inventory Planning:**

- Frequent buyers may require better stock availability for their preferred products, while high-value customers may benefit from exclusive or personalized product offerings.

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## **5. Conclusion**

The clustering exercise has successfully provided meaningful insights into customer behaviour. The segmentation helps in identifying opportunities to engage different types of customers more effectively. By understanding their frequency, spending, and average transaction value, the business can create tailored strategies to maximize customer satisfaction and revenue growth.