**Clustering Results Report**

**Introduction**

Clustering is a critical process in customer segmentation, helping to group individuals based on shared characteristics and behaviors. This report focuses on identifying meaningful customer segments using clustering techniques, allowing businesses to understand and target distinct groups effectively.

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**Clustering Analysis**

The **K-Means clustering algorithm** was employed for this analysis, which is well-suited for segmenting both numerical and categorical data. Clusters ranging from 2 to 10 were evaluated to identify the optimal number of groupings.

The performance of each clustering configuration was assessed using two key metrics:

1. **Davies-Bouldin Index (DB Index)**: Lower values indicate well-separated and compact clusters.
2. **Silhouette Score**: Higher values reflect better-defined and separated clusters.

The analysis revealed that the **optimal number of clusters is 4**, with a DB Index of **0.445**. This demonstrates the presence of clear and well-defined segments in the dataset.

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**Visualization and Insights**

To visualize the clustering results, **PCA (Principal Component Analysis)** was used to reduce the dataset to two dimensions. The resulting scatter plot clearly illustrates the separation between the 4 clusters, ensuring their interpretability and confirming the quality of the segmentation.

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**Conclusion**

The clustering process successfully identified 4 distinct customer groups, offering insights into unique patterns within the data. These clusters provide a strong foundation for targeted marketing, personalized customer engagement, and strategic decision-making.

This report highlights the effectiveness of K-Means clustering in producing actionable results, which can be further leveraged for improving customer satisfaction and business performance.