**Conclusions**

Based on the provided table and considering the different categories of evaluation metrics (silhouette score, Calinski-Harabasz index, Davies-Bouldin index), here are the best-performing combinations for each category which I have concluded:

**1. Best for Silhouette Score:**

The combination of PCA transformation followed by normalization (T+N) seems to consistently yield the highest silhouette scores across different numbers of clusters and clustering algorithms.

**2. Best for Calinski-Harabasz Index:**

The combination of PCA transformation followed by normalization (T+N) also tends to perform well in terms of the Calinski-Harabasz index, consistently providing higher values compared to other preprocessing techniques and combinations.

**3. Best for Davies-Bouldin Index:**

The best-performing combination for the Davies-Bouldin index varies slightly depending on the number of clusters and clustering algorithm used. However, in general, PCA transformation alone (T) or combined with normalization (T+N) tends to produce lower Davies-Bouldin index values compared to other preprocessing techniques and combinations.

* For the K-Means, PCA transformation alone (T) or combined with normalization (T+N) generally produces lower values, indicating better clustering qual
* For Hierarchical Clustering,it slightly varies here PCA transformation alone (T) or combined with normalization (T+N) generally leads to lower values.
* K-Mean Shift, PCA transformation alone (T) or combined with normalization (T+N) generally produces lower values.

**Overall, based on these observations, the combination of PCA transformation followed by normalization (T+N) appears to be the most effective across different evaluation metrics. However, it's essential to consider the specific characteristics of the dataset and the clustering goals when determining the best approach.**

**From observations K-Mean shift is best algorithm and best number of clusters is 3 with best silhouette 0.6577**