# ABSTRACT

*This research aims to optimize the number of clusters in cosmetic product sales analysis using the K-Medoids algorithm on KTT store sales data. To determine the optimal number of clusters, we applied the elbow method, silhouette analysis, and gap statistic using Python during data analysis and algorithm implementation. The analyzed dataset includes monthly sales data with attributes such as number of units sold, unit price, and total revenue. In the three methods, each has different characteristics so as to produce different values of the optimum number of clusters for the dataset used, the difference in determining the optimal number of clusters does not mean aborting or weakening between one method and another, but can be used to evaluate one and the other. Where in this study the optimal number of clusters is determined by considering the results of each method by taking the middle value. There are 2 categories of product groupings that have the most sales and products that sell less. There are 3 product categories that have the most sales, namely wardah, somethinc, and focallure. While the product kategoris that sell less are 2 kategoris, namely instaperfect and dazzle me.*

***Keywords -*** *Clustering, K-Medoids, Elbow Method, Silhouette Analysis, Gap Statistic.*