

## ABSTRACT

### **COMBINATION OF K-MEANS WITH PARTICLE SWARM OPTIMIZATION FOR CLUSTERING SUPERMARKET SALES DATA**

By

Ryana Purwaningrum

20110017

*Supermarkets are a type of large store that offers a variety of retail goods in large quantities, including household appliances, food, drinks and other products. To improve stock management, reduce waste, and respond to changes in market demand, an effective sales strategy is needed. One approach that can be used is the clustering method in data mining, which utilizes information technology. The K-Means algorithm is one of the most commonly used algorithms for clustering, but has a weakness in determining the centroid value which can result in it falling to the local optimal point. Particle Swarm Optimization is an algorithm that can be used to optimize the K-Means centroid value, so that the resulting cluster is more optimal. This research proposes a combination of the K-Means dan Particle Swarm Optimization algorithm. The aim of this research is to improve the initial initialization of cluster centers. By using the elbow method, 3 optimal clusters were obtained. Results from this research Analysis From this, the combination of Particle Swarm Optimization with K-Means produces a Sum of Squared Errors (SSE) value that is much higher compared to K-Means alone, showing a greater spread between data points and the centroids of their groups. Nevertheless, both have the same Davies-Bouldin Index (DBI) values, indicating comparable clustering quality in terms of separation between clusters and compactness within clusters. However, the combination of Particle Swarm Optimization with K-Means has a lower Quantization Error value, indicating its effectiveness in mapping data to centroids better, which leads to more accurate clustering. Therefore, the combination method of Particle Swarm Optimization with K-Means is superior.*

**Keywords:** *Supermarkets, Sales Strategy, Clustering, Particle Swarm Optimization, and K-Means*