

ABSTRACT

Effective warehouse management is crucial for the smooth operations of Toko Bangunan Gardatama Mandiri, which plays a vital role in supporting infrastructure development. Manual item placement, which has not yet been supported by digital transformation, often leads to suboptimal warehouse space management, irregularly placed items, and inefficient use of warehouse space, making the item grouping process inefficient. This research aims to group items based on their characteristics using the K-Means++ Clustering algorithm, chosen for its superiority in producing more stable and optimal clusters. This method was applied to 160 types of items with parameters including stock, length, width, weight, and thickness. The results show that the K-Means++ algorithm successfully grouped the 160 items into 4 clusters, where cluster 0 consists of 41 items, cluster 1 consists of 41 items, cluster 2 consists of 20 items, and cluster 3 consists of 58 items. The quality of the clustering was validated using the Silhouette Score, achieving a value of 0.538, which indicates good cluster quality. A website-based system was developed to implement this analysis, displaying a structured layout of items in the warehouse to enhance operational efficiency, minimize placement errors, and support faster, more accurate data-driven decision-making.

Keywords: *K-Means++, Clustering, Silhouette Score, Warehouse, Building Material Store.*