Effects of Association-Rules' Characteristics on The Performances of Storage Relocation Problem: A Case of Foods' Raw Materials Warehouse

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Abstract. The case study has faced with the problem of insufficient space inside the warehouse storage and the items are placed in an appropriate layout, causing the unnecessary travel distances in picking processes. The purpose of this study is to explore the effects of the association rules, generating by two famous algorithms, namely Apriori and FP-Growth on designing the storage location assignment and warehouse layout. Dataset using in this study is the customer orders obtaining from the sale database between June 2020 and August 2021. 124,243 records were used to analyze with two algorithms: Apriori and FP-Growth technique. The generated rules then applied to design the warehouse layouts and correlated storage relocation assignment. The simulation analysis was conducted to test the performance of total travel distances between two associate-based layouts. The 1,000 replications were chosen randomly from 20 picklists. The results shows that the Apriori technique was generating lower rules than the FPGrowth one in a range of support between 90-96%, but the Apriori algorithm has a higher confidence than another technique in an average range of confidence at 97.60%. We also found that the average picking distances of two techniques were different at 99% of confidential interval. We conclude that the Apriori technique can help reducing the travel distances from 6,406 to 2,963 meters. It contributes to 52% of reduction comparing to FP-Growth that can reduce as 50% from the original layouts.

Keywords: Applications of Association Analysis, Storage Re-location Assignment Problem, Warehouse Improvement, Case Study